TAMPEREEN TEKNILLINEN YLIOPISTO
TAMPERE UNIVERSITY OF TECHNOLOGY

Hanna-Riikka Sundberg

The Role of User Experience in a Business-to-Business Context

Julkaisu 1278 • Publication 1278

Tampere 2015

Tampereen teknillinen yliopisto. Julkaisu 1278
Tampere University of Technology. Publication 1278

Hanna-Riikka Sundberg

The Role of User Experience in a Business-to-Business Context

Thesis for the degree of Doctor of Science in Technology to be presented with due permission for public examination and criticism in Festia Building, Auditorium Pieni Sali 1, at Tampere University of Technology, on the 30th of January 2015, at 12 noon.

Tampereen teknillinen yliopisto - Tampere University of Technology
Tampere 2015

ISBN 978-952-15-3445-4 (printed)
ISBN 978-952-15-3450-8 (PDF)
ISSN 1459-2045

Abstract

As industrial companies strive to discover new ways to provide value for their customers, their focus has shifted from offering products and services to creating superior experiences for customers and users. This study focuses on the role of user experience (UX) in a business-to-business (B2B) context. The main objective is to increase the understanding of how UX is perceived and utilized in the suppliers' and customers' activities within a B2B context. From the suppliers' view, the focus is on the role of UX in research and development (R&D) and also in sales and marketing (S&M). In the customer companies, the aim is to create knowledge about whether UX has an impact on technology investment decisions. In addition, a comparison is made between the users and designers of specific products considering the importance of UX-related attributes.

A case study research strategy was adopted in order to better understand complex phenomena and the dynamics present within single settings. An embedded case study design included three cases, all of which consisted of one supplier company and two customer companies. As the study follows the research paradigm of pragmatism, both qualitative and quantitative methods are employed to address the research questions.

The results suggest that although UX was seen as an important aspect, some challenges occurred in utilizing UX-related knowledge. Although supplier companies focused on designing better experiences for the users, methods for utilizing UX in new product development (NPD) were not internalized yet in all cases and other stakeholders working outside of R&D were not actively involved in the design process. Considering UX in sales activities, it was found challenging to transfer the benefits of UX into sales argumentation or to find suitable methods for disseminating UX-related knowledge effectively for potential customers.

From the customers' point of view, UX can have an indirect impact on supplier selection as previous experiences of the supplier and their products affect decision making. The products' market superiority and technical details, as well as the supplier company's reliability, were considered the most important aspects in choosing a supplier. The results also suggest that R&D mostly agrees on which UX-related attributes are important for users. The results indicate that the pragmatic aspects (e.g. reliability, ease-of-use) of technological products are more important than the hedonic aspects (e.g. attractiveness, visual aesthetics).

The study's findings contribute to both prior research and managerial practices. The research provides new knowledge to the research streams of UX as well as customer value in the B2B context. First, a framework is presented in order to combine these theories and illustrate the benefits of UX for different stakeholders. The findings of the empirical part of the study contribute especially in the research on user-centered design and value-based UX selling, as well as the value of UX in technology investment decisions. Based on previous studies on UX measurement, this research also offers a systematically constructed tool for measuring the importance of UX in different contexts. The study also provides practical implications for managers striving to incorporate UX into everyday practices in their company.

Tiivistelmä

Teollisten yritysten pyrkiessä löytämään uusia keinoja tuottaa arvoa asiakkailleen, on havaittavissa siirtymä tuotteiden ja palveluiden tarjoamisesta ylivertaisten kokemusten luomiseen asiakkaille ja tuotteiden loppukäyttäjille. Tämä tutkimus keskittyy käyttäjäkokemuksen rooliin yrityskontekstissa. Tutkimuksen tavoitteena on lisätä ymmärrystä siitä, miten käyttäjäkokemus koetaan ja miten sitä hyödynnetään toimittajien ja asiakkaiden toiminnoissa yrityskontekstissa. Toimittajien näkökulmasta käyttäjäkokemuksen roolia tutkitaan tuotekehityksessä sekä myynnissä ja markkinoinnissa. Asiakasyrityksissä tarkoitus on tuottaa tietoa siitä, onko käyttäjäkokemuksella vaikutusta teknologian hankintaan liittyvissä päätöksissä. Lisäksi tutkimuksessa on vertailtu tuotteiden suunnittelijoiden ja käyttäjien näkemyksiä käyttäjäkokemukseen liittyvien tekijöiden tärkeydestä.

Tutkimusstrategiana käytettiin tapaustutkimusta, joka mahdollistaa monitahoisten ilmiöiden sekä sisäisen dynamiikan ymmärtämisen yksittäisissä tapauksissa. Tutkimus koostui kolmesta tapaustutkimuksesta, joista jokainen sisälsi yhden toimittajayrityksen ja kaksi asiakasyritystä. Koska tutkimus on luonteeltaan pragmaattinen, tutkimuskysymysten vastaamiseen käytettiin sekä kvalitatiivisia että kvantitatiivisia menetelmiä.

Tutkimuksen tulokset osoittavat, että vaikka käyttäjäkokemus koettiin tärkeänä, käyttäjäkokemukseen liittyvän tiedon hyödyntämisessä ilmeni haasteita. Vaikka toimittajat keskittyivät parempien kokemusten suunnitteluun tuotteidensa käyttäjille, menetelmiä käyttäjäkokemuksen hyödyntämiseen tuotteiden kehittämisessä ei ollut vielä sisäistetty kaikissa tapauksissa. Myöskään tuotekehityksen ulkopuoliset sidosryhmät eivät aktiivisesti osallistuneet kehitysprosessiin. Erityisesti käyttäjäkokemuksen tuomien etujen muuttaminen myyntiargumenteiksi sekä sopivien menetelmien löytäminen tiedon välittämiseksi potentiaalisille asiakkaille koettiin myyntitoiminnassa haasteelliseksi.

Asiakkaiden näkökulmasta käyttäjäkokemuksella voi olla epäsuora vaikutus toimittajan valintaan, sillä aikaisemmat kokemukset toimittajasta ja heidän tuotteistaan voivat vaikuttaa investointipäätökseen. Tuotteen paremmuus markkinoilla ja sen tekniset ominaisuudet, kuten myös toimittajan luotettavuus koettiin kaikista tärkeimpinä tekijöinä toimittajaa valittaessa. Tulokset myös osoittavat, että tuotteiden kehittäjät kokevat suurimmaksi osaksi samat käyttäjäkokemukseen liittyvät tekijät tärkeinä kuin tuotteiden käyttäjät. Erityisesti pragmaattiset tekijät (esim. luotettavuus, käytön helppous) koettiin tärkeämpinä kuin hedonistiset tekijät (esim. houkuttelevuus, hyvännäköisyys).

Tutkimuksen tulokset tuovat oman kontribuutionsa sekä aikaisempaan tutkimukseen että johtamiskäytäntöihin liittyen. Tutkimus tarjoaa uutta tietoa käyttäjäkokemuksen ja asiakasarvon tutkimukseen yrityskontekstissa. Ensinnäkin, teoreettinen viitekehys yhdistää edellä mainitut teoriat osoittaakseen käyttäjäkokemuksen hyödyt eri sidosryhmille. Empiirisen osuuden tulokset tuovat oman panoksensa käyttäjäkeskeisen suunnittelun ja käyttäjäkokemuksen arvopohjaisen myynnin tutkimuksiin, kuten myös käyttäjäkokemukseen arvoon teknologian investointipäätöksissä. Aikaisempiin tutkimuksiin pohjaten tutkimus tarjoaa myös systemaattisesti rakennetun menetelmän käyttäjäkokemuksen tärkeyden mittaamiseen. Tutkimus tarjoaa myös ehdotuksia johdolle siitä, miten käyttäjäkokemusta voidaan sisällyttää yrityksen jokapäiväisiin käytäntöihin.

Preface

"The only source of knowledge is experience."

- Albert Einstein -

During the process of writing this dissertation I have gained various experiences that have been influenced by a large group of people. Within this preface I would like to thank those who have provided their time, knowledge and support in creating this memorable experience with me. This is for those who I admire, respect and love.

When it comes to gaining academic and work experience, I have had the privilege to work with some incredible and intellect individuals. Professor Saku Mäkinen, I am amazed how you always seem to catch my train of thought even when I am finding it difficult to be specific or even articulate. Every conversation we had helped me focus on what is important in my research. Thank you for all your wise words and for the supervision of my dissertation.

I am also grateful for my second supervisor, Associate Professor Marko Seppänen. Because of you, I was initially recruited as a researcher for CITER (Center for Innovation and Technology Management). I was also able to work with you in the UXUS project, which has been one of the best experiences in my work life so far. Thank you for all the advice you have provided along the way, but most of all, for taking interest in my life outside of the university. I am sure you will be a wonderful supervisor and example for all your future employees as well.

My dissertation would not have been in its current form without the help of my preliminary examiners, Professor Kjell Grønhaug and Associate Professor Sampsa Hyysalo. I am especially grateful for the enlightening conversation I had with Sampsa and all the great advice you gave that helped me finalize my work. Thank you for the time and effort you took in revising my dissertation.

Within the UXUS project, there are several people who have helped me along the way. Thank you for all the company representatives for letting me explore the concept of user experience in a business context. A special recognition goes to Heli Väätäjä and Tuomas Oja for giving me a crash course on UX measurement instruments and assisting me with forming the survey for the quantitative part of this study.

Financing ones doctoral studies and research can be a tricky business. However, I was lucky enough to work for the UXUS project which is promoted by FIMECC and funded by Tekes. I am also grateful for the additional grants received from the Foundation for Economic Education and Tampereen Liikesivistyssäätiö.

Above all, working as a researcher in the Department of Industrial Management has been an important social experience for me. I have had the opportunity to meet some amazing people who have inspired me in so many ways. My very first research community was a group of likeminded young researchers, with whom I have developed friendships that will last for a lifetime. Thank you Irinja, Karoliina and Jesse for all the great times in the past as well as in the future.

I have also had the privilege to belong to an unofficial group inside our work community - the Teta SB team – with Eeva, Sanna, Toni, Tommi, Mika and Santtu. I have always been and always will be the youngster in this party, but I have never felt belittled in your company. Thank you also for all my former and current CITERians and everyone who have shared the fancy office of FB118 with me. And not to forget all the rest of the people working in our department, who I have gotten to know during these years and who have shared their interesting stories with me during coffee breaks and other unofficial events.

In addition to all the knowledge I have gained during my career as a researcher, I have learned the most important things through life experience. With the continuous support and encouragement from my parents, Ritva and Veli-Tapani, I have achieved the goals I have set for myself and gained the most valuable skills to succeed in life. Thank you for always being there for me. When it comes to family, I have always looked up to my big brother Vesa, and adored my sister-in-law Hanni. I am grateful for having such supportive surroundings back at home.

The last person on my list is also the most important one - my beloved husband Jaakko. With you I have gained the best experiences in both life and love. Thank you for being such a positive person and for enjoying all the little things in life with me.

Tampere 01.12.2014

Hanna-Riikka Sundberg

Contents

List of Figures

List of Tables

List of Abbreviations

B2B	Business-to-Business
B2C	Business-to-Consumer
CX	Customer Experience
ERP	Enterprise Resource Planning
FIMECC	Finnish Metals and Engineering Competence Cluster
HCI	Human-Computer Interaction
IT	Information Technology
MES	Manufacturing Execution System
NPD	New Product Development
OEM	Original Equipment Manufacturer
R&D	Research and Development
S&M	Sales and Marketing
SAM	Self-Assessment Manikin
SUMI	Software Usability Measurement Inventory
UCD	User-Centered Design
UX	User Experience
UXUS	User Experience and Usability in Complex Systems
WOM	Word-of-Mouth

1 Introduction

This introduction chapter outlines the study by introducing the main topics of interest, objectives of the study and the structure of the dissertation. The chapter begins by demonstrating the background and motivation for the research in order to provide an overview of the key concepts and the linkage to prior research. After outlining the topics of interest, the focus of the study is presented in the form of research objectives. The scope and delimitations are also provided in order to define the boundaries of the study. The end of the introduction chapter presents an illustration of the dissertation's structure as an overview of the whole study.

1.1 Background and motivation

In order to maintain and develop their business, companies have to continuously find ways to differentiate their product and service offerings from competitors. Especially in the metals and engineering industry, where supplier companies provide products with similar basic functions and features, the key to success is to excel in developing offerings based on customers' requirements. For companies to gain competitive advantage it is vital to understand customers' needs and processes to provide offerings that create superior value for current and potential customers.

Customer value has been widely researched from the viewpoint of supplier and customer companies (Lindgreen et al. 2012), especially in marketing and management literature, and it is one of the central research topics in both consumer and business markets. Understanding the basis of customer value is perceived as an important source for competitive advantage and the foundation for long-term buyer-supplier relationships (e.g., Ravald & Grönroos, 1996; Ulaga & Chacour, 2001; Eggert et al. 2006). It is even stated that creating customer value should be the cornerstone of every business (Anderson et al. 1993).

From a practical point of view, a lively discussion of UX as a source for competitive advantage and value for customers takes place on the internet and in other media as well (e.g. Plewes, 2012; Del Angel, 2013; Shamlin, 2013; Lee, 2014). Especially in business-to-consumer (B2C) markets, com-

panies have already understood the importance of providing positive experiences to customers and users (e.g. Freeman, 2014). Also, companies that work in B2B industries have shifted their focus from a product-oriented view to an experience-oriented view. KONE (2014), a global leader in the elevator and escalator industry, states a brand promise—'Dedicated to People Flow'—which involves a commitment to ensuring that their products and services provide the best People Flow experience for customers and users. The benefits of employing UX in the design process of new products is widely acknowledged in academia as well (e.g. Forlizzi & Battarbee, 2004; Kujala, 2008; Mahlke, 2008; ISO 9241-210:2010; Hartson & Pyla, 2012). Despite this, companies occasionally fail in acquiring the right kind of information from users and customers, which can lead to poor decisions in R&D. The question then is how suppliers can gain information, identify the needs of their customers and find ways to exceed their expectations. And what kind of role should the experience of customers and users have in designing new offerings?

When purchasing a product or service, the customer always has an experience, whether it is good, bad or indifferent. This holds true considering the use of a product or service as well. The key is how effectively the supplier company manages these experiences (Berry et al. 2002). In B2B markets, suppliers have to manage at least two kinds of experiences: 1) the customer's experience, which consists of the overall relationship and encounters with the supplier, the purchase of the product or service and the total value of the acquisition to the customer company (e.g. Berry, 2002; Meyer & Schwager, 2007; Rintamäki et al. 2007), and 2) the user's experience, which consists of the use of the offering, the effect of the product on their work tasks and the value of the product in use (Law et al., 2009; Vermeeren et al. 2010; Park & Han, 2013).

UX is widely studied in B2C markets (Bargas-Avila & Hornbaek, 2011) where the product purchaser is also the user of the product However, in B2B markets, the actual users might not participate in the investment decision of a new technology. In this sense the product is not chosen by the user but is a provided tool that aids in completing work tasks. Nevertheless, the experience a person has from using the product can affect their work motivation, efficiency, health and so forth, which has an effect on the performance of the whole company. Because of this, knowledge is needed on how UX is utilized in sales activities and whether user activities have an impact on technology investment decisions.

Prior research on the ambiguous topics of UX and customer value mostly concentrates on B2C industries (Bargas-Avila & Hornbaek 2011; Lindgreen et al. 2012) and only a few attempts have been made to connect these research streams (Väätäjä et al. 2014). This study explores the role of UX in B2B relationships by approaching the topic from the viewpoint of research and development, sales and marketing and technology investment decisions. In the next chapter, the research objectives of the study are presented in more detail.

1.2 Research objectives

The purpose of this dissertation is to investigate the role of UX in four different contexts. In the supplier companies the functions under investigation are: 1) research and development and 2) sales and marketing; and in customer companies, the focus is on 3) the technology investment decisions and 4) the context of use. The reason for choosing these functions is to understand the role of UX in the functions that most evidently connect the supplier and the customer in a B2B relationship.

In order to sell products to customers, new offerings have to be developed linking the R&D and S&M departments together. In addition to understanding the role of UX in these activities separately, one of the goals is to understand how these departments co-operate in producing offerings for customers (RQ1-RQ1b). Most of the exchange (products, services, information, financial and social aspects) between these parties occurs in the buyer-supplier interface between the salespeople from the supplier company and the people involved in the technology investment decisions from the customer company. The people involved in making the decision are influenced by the sales and marketing people from the supplier company as well as the product users in the customer company. The focus here is on the role of UX in technology investment decisions (RQ2). On the other hand, R&D is linked to the product users, since users are the individuals who use the products in a work context in the customer company. The focus here is to understand whether these parties agree on which UX targets are important (RQ3). The research setting is illustrated in Figure 1.

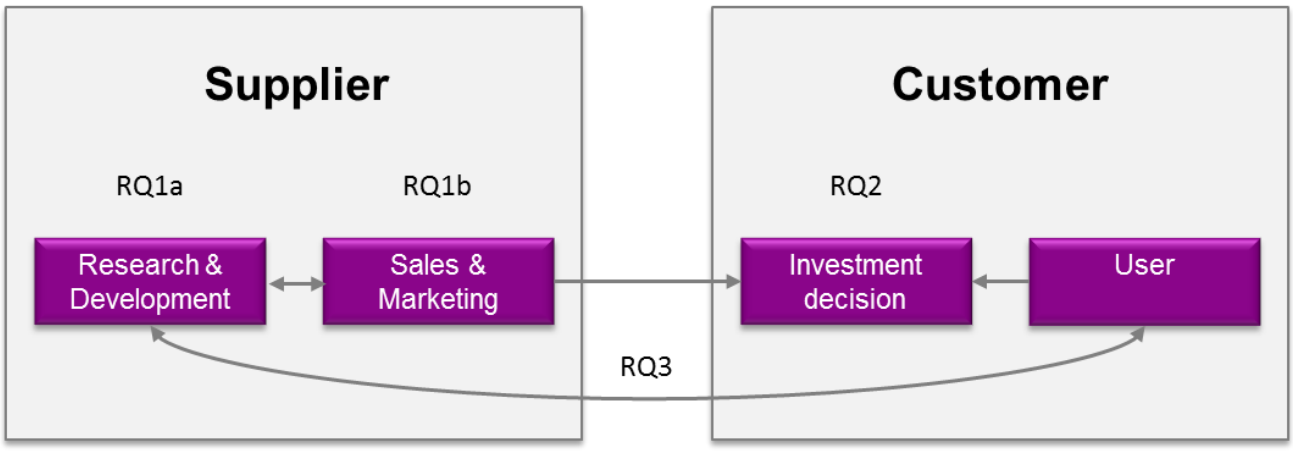


Figure 1 *Operations under research.*

First of all, UX is studied in the suppliers' environment. The aim is to understand the role of UX in both R&D and S&M activities. In R&D the focus is especially on the NPD process of a specific product. In S&M the focus is on the sales and marketing activities of the same predefined product. This includes investigating how UX is perceived by the respondents and whether it is a relevant

concept in their work. In addition, the question aims to understand how UX-related knowledge is utilized in work tasks within both functions. One example considering the role of UX in R&D is whether user experience research is conducted before initiating a new product development process. The first research question can be defined in the following manner, including two sub-questions relating to different supplier functions:

RQ1. What is the role of UX in suppliers' functions?

RQ1a. How is UX perceived and utilized in the suppliers' new product development process?

RQ1b. How is UX perceived and utilized in the suppliers' sales and marketing activities?

UX is also studied in the supplier-customer interface. The interest in this part of the study is to understand the criteria for technology investment decisions in customer companies. One key issue is identifying whether UX has an impact on these decisions compared to, for example, economic aspects of the investment. In addition, user involvement in the actual investment decision process is perceived as a research interest. Since these decisions are often affected by the information, details and images provided by the seller, the supplier's sales argumentation is also of interest. The second research question can be framed as follows:

RQ2. What is the role of UX in customers' technology investment decisions?

The third research question relates to studying UX between actual users in the customer company and the R&D department of the supplier company. The interest here is to investigate what aspects related to UX are essential from the users' perspective. The interest is in finding out whether R&D finds the same UX-related factors important as well. A comparison between these results reveals how well the suppliers understand what the user's value. This research question can be formulated as follows:

RQ3. What UX-related factors are perceived as important in the NPD process and usage of specific products?

In order to address these questions both qualitative and quantitative measures are used. The first two research questions are answered with qualitative interviews, and a survey is conducted to answer the third research question. A more detailed overview of the research design and methods is presented in Chapter 3.

1.3 Scope and delimitations

The delimitations are the characteristics that limit the scope and define the boundaries of this study. There were four different areas in which delimitations were made: 1) the empirical context of the research, 2) the theoretical framework, 3) research philosophy and methods and 4) the units of

analysis. Considering the research context, UX was chosen to be studied in a B2B setting. Although UX has been vastly studied in the B2C context (e.g. Bargas-Avila & Hornbaek, 2011), its meaning in the relationship between suppliers and customers is a topic that has not yet received much interest. The Finnish Metals and Engineering Industry was chosen as the empirical context since the 'User Experience and Usability in Complex Systems' (UXUS) program belongs to the Finnish Metals and Engineering Competence Cluster (FIMECC).

As for the theoretical delimitations, this study discusses UX and customer value as the theoretical framework. There were many other theoretical premises considered, especially for the part which focuses on the customers' technology investment decision. For instance, the theories of investment decision, purchase decision and organizational buying behavior were widely investigated when searching for a suitable theoretical framework. However, these theories were rejected for different reasons. The investment decision theory is often cited in studies considering investments in companies and the stock exchange. The purchase decisions theory usually relates to articles studying the criteria for purchases. The difference between purchases and investments is that purchases are made regularly from selected subcontractors, considering for example, parts for manufacturing. However, technology investments are made for acquiring, for example, manufacturing equipment. Therefore the criteria for purchases and investments differ. Organizational buying behavior concentrates on the psychological side of decision-making and the structured processes of these decisions which was not of particular interest in this study. Customer value was chosen as the theoretical framework since it considers the product, service and relational aspects of investment decisions: it models all the potential benefits that a customer receives from having a relationship with the supplier. It was also of interest in this study whether UX could be defined as an aspect of customer value.

The research philosophy selected for this study was that of pragmatism. It was chosen in order to not bind the study to either interpretivism or positivism but rather to select the most suitable research method for each research question (Yardley & Bishop, 2008). A case study research strategy was selected since it is suitable for studying complex phenomena (Gummesson, 1993) in single settings (Eisenhardt, 1989). It is also a versatile strategy since it offers the possibility to apply different research methods, examine one or few entities (person, group or organization) and to answer questions such as 'why' and 'how' (Benbasat et al. 1987).

The units of analysis were selected in reference to the research questions. For each company a specific product was chosen which limited the study informants to those that were involved in either the R&D process of the product, the S&M activities of the product, the investment decision of the product or the use of the product. This study could have concentrated on either the suppliers' or customers' activities alone. However, it was interesting to understand the phenomena of UX as a continuum in a B2B context: how UX is considered in R&D, how it is emphasized in sS&M, whether it is relevant in the investment decision and what aspects of experience are ultimately important for the users.

1.4 Structure of the dissertation

The structure of the dissertation is demonstrated in Figure 2. Chapter 1 introduces the study; it provides the reasons why this dissertation is made, defines the objectives, outlines the study and describes the contents. Most importantly, the research questions that this dissertation answers are presented.

In order to familiarize the context of the study, a summary of the relevant literature addressing the main research themes is presented in Chapter 2. First, the nature of B2B relationships is demonstrated in order to specify the context of this study. Second, the concept of customer value is defined. This includes the meaning of customer value in the B2B context, its relevance in investment decisions and how suppliers should create their value proposition. Third, the concept of UX and its role in NPD is defined. Finally, a summary concludes the theoretical chapter by connecting the abovementioned theoretical foundations.

In Chapter 3 the research design and methods are introduced, justifying the choices made considering the research strategy and underlying philosophy. A detailed explanation of the research design, collected data and analysis methods are given in order to provide an understanding of how the study was conducted.

In Chapter 4 the results of the empirical part of the study are presented. The results of each case entity are described in their own sections. These sections are divided so that the subsections answer the research questions provided in the introduction. First, UX is discussed from the suppliers' point of view. The focus is to understand how UX is taken into consideration in NPD and sales processes. Second, UX is studied in the customers' technology investment decisions. The aim here is to gain knowledge on what criteria is considered for choosing a new technology, how users are involved in decision-making and what kind of role experience with previous technologies has when choosing a supplier. In the third and last part of each section, perceptions on the importance of user experience-related attributes are compared between the suppliers' R&D team and the technology users from the customer companies.

Chapter 5 discusses the findings, answers the research questions and links the results to previous literature considering UX and customer value. In Chapter 6 a summary of the study is provided followed by a demonstration of contributions, a critical evaluation of the study and avenues for further research.

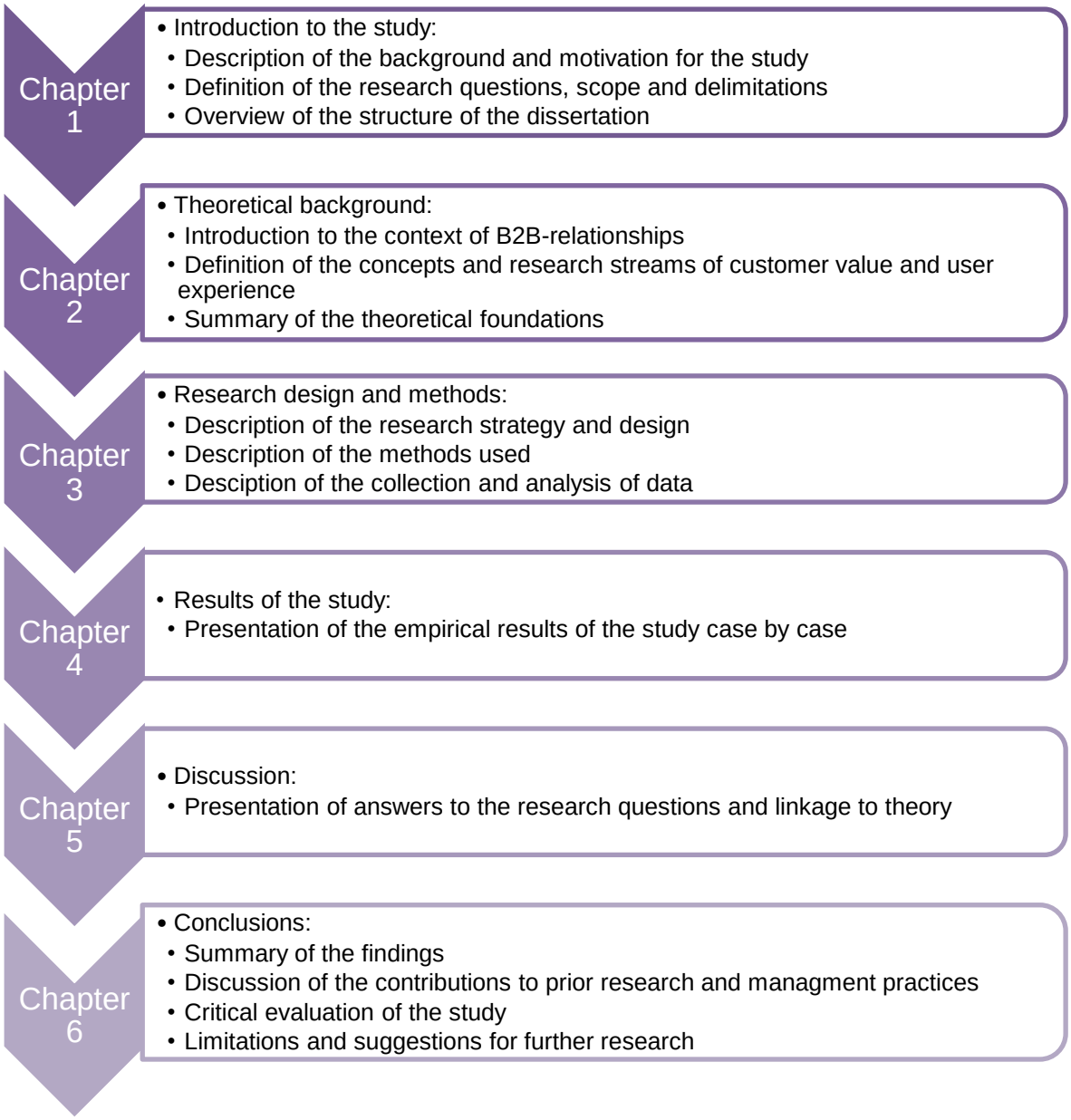


Figure 2 *Outline of the dissertation.*

2 Theoretical background

This chapter introduces the main theoretical foundations of this study. The context of B2B relationships is demonstrated, including the discussions of B2B companies as part of value networks, the characteristics of B2B relationships and the nature of organizational buying processes in business customer companies. The second part of the theoretical background concentrates on the notion of customer value and how it affects the formation of business relationships. This includes the definition of customer value and discussions on how value is evaluated in technology investment decisions, including how suppliers should articulate value in order to attract customers. The third part of this chapter focuses on UX, particularly the utilization of UX and the involvement of different parties in the design of new products. In addition, the central methods for measuring UX in this study are introduced. The summary part of this chapter combines these theoretical viewpoints to further demonstrate how they link to each other and build the theoretical framework for this study.

2.1 Business-to-business relationships

Both UX and customer value are studied extensively in the context of B2C markets (e.g. Bargas-Avila & Hornbaek 2011; Lindgreen et al. 2012). In these transactions, the individual who makes the purchase decision is also often the one who evaluates the value received from the acquisition and use of the product or service. However, in business markets the buying process is more complex, often involving employees from different levels of an organization. In addition, the nature of relationships is different in business and consumer markets, which also affects organizational buying behavior. Within the academic discussion of business practice, the terms ‘relationships’ and ‘networks’ are widely used (Håkansson & Ford, 2002). In this first chapter of the study’s theoretical background, the concept of business networks and characteristics of B2B relationships are introduced in order to specify the context in which this study was conducted. In addition, the nature of organizational buying processes is introduced in order to provide an understanding of the complexity of investment decisions for business customers.

2.1.1 Business companies within value networks

Recent research in B2B marketing concentrates on two important trends: 1) business relationships and business networks as opposed to single market transactions and 2) the value of business relationships over the value of goods or services exchanged (Albadvi & Hosseini, 2011; Corsaro et al. 2012). Shifting the focus from traditional transactional business to relationship marketing has resulted in the emergence and development of concepts such as 'relationship value' (Ulaga & Eggert, 2005; 2006) and 'value networks' (Jarillo, 1988; Möller & Halinen, 1999; Parolini, 1999).

Business relationships can be considered the basis of all business without which no company can operate (Ford et al. 2011). They enable the sales and purchasing of products and services necessary for a company's operations. A significant proportion of the value of a supplier's offering to its customer is a result of the skills and resources of a network of suppliers. This is why a company's success is not only dependent on their own efforts but also the efforts and intentions of other companies within the network. Because of this, some of the challenges that companies face are choosing high-value business customers, building and maintaining relationships with them and creating a competitive advantage in a complex and dynamic business network (Albadvi & Hosseini, 2011). A business network can be defined as a set of two or more connected business relationships in which each exchange relation is between business firms that are conceptualized as collective actors (Emerson, 1981). According to Wilkinson and Young (2002), networks are loosely connected systems of actors and relationships which cannot be dominated by any single company.

Every business relationship should be viewed as part of a wider network (Ford et al. 2011) that is a combination of actors, resources and activities (Håkansson & Johanson, 1992; Håkansson & Snehota, 1995). This means that companies have to manage their own resources as well as activities of their suppliers and customers (Ford et al. 2011). They also have to decide how much of their own resources and activities will be devoted to a relationship and how dependent they want to be of their suppliers' capital.

Based on the resource-dependence theory (Pfeffer & Salancik, 1978), companies interact with each other in order to access other's resources which are required to develop their own business activities (Baraldi & Strömsen, 2006; Ford et al. 2011; Corsaro et al. 2012). Ordanini (2005) acknowledges three notions considering the resource-based view: 1) a resource is anything that can have an impact on a firm's performance (Black & Boal, 1994); 2) a firm's competitive position is based on the resources it is able to control or share (Peteraf, 1993); and 3) in order to sustain a competitive advantage the resources should be valuable, rare and difficult to imitate or substitute (Barney, 1991). Although building relationships is important in order to access these valuable resources, it should also be noted that high-involvement relationships are not only resource contributors but also require substantial investments from companies (Gadde et al. 2003).

Aldrich and Ruef (2006) describe organizations as goal-directed activity systems. The most fundamental activity of a company is interaction based on the exchange of products and services and concerned with how the flow of goods and information is organized between two firms (Gadde et al. 2003). The value of linking activities between firms is bounded in the opportunity to rationalize important operations which extend over ownership boundaries. These activities include, for example, the flow of materials, joint customer-supplier projects in product development and buyer-seller operations in service marketing. These business activities should be considered as a part of a larger entity and dependent on the activities of other counterparts within networks (Gadde et al. 2003).

Different types of value configurations exist, such as the value chain, value shop and value networks (Stabell & Fjeldstad, 1998). The value chain model introduced by Porter (1985) is one of the fundamental concepts on which later research has been based, especially in the supply literature (Huemer, 2006). It describes the activities involved in a supplier's environment that transform inputs into products. These value chain activities can include product design and development, supply, production, distribution, marketing and sales, after-sales service and supporting activities such as finance and planning, human resource management, information technology and process development and purchasing (Rieple & Singh, 2010). In order to understand which activities actually create value, a value chain analysis is usually conducted (Stabell & Fjeldstad, 1998; Rieple & Singh, 2010). The aim of this is to identify inefficient activities and improve the overall process so that more value can be created compared to costs. The value chain model, however, is criticized for being too product- and transaction-oriented since it perceives the product as the medium for transferring value between supplier companies and their customers (Stabell & Fjeldstad, 1998). According to this model, value is only added by moving from suppliers to buyers (Corsaro et al. 2012).

While value chains are based on a fixed set of activities, value shops schedule activities and apply resources to solving specific problems for customers (Gadde et al. 2003). The selection, combination and order of applied resources and activities vary based on the requirements of the problem at hand (Stabell & Fjeldstad, 1998). Typical examples of value shops include professional services providers. When moving towards the network level, value is not created solely along a value chain nor is it based on solving a particular problem. Considering these approaches the value network is useful in assessing business relationships, as it takes into account both tangible and intangible value exchanges between multiple organizations aimed at generating value for a network participant (Albadvi & Hosseini, 2011).

According to Lusch et al. (2010), the actors of a value network are bound together by their competences, relationships and information. The competences are used to provide services to customers and suppliers with whom the companies have relationships. Within these networks, information is also shared through common standards and protocols. The idea behind building relationships and networks between companies is that, by the exchange of intellectual capital as well as other resources, the parties involved gain mutually beneficial value. By collaborating with other actors in

the network companies can increase value creation by getting access to relevant knowledge and other resources (Fjeldstad et al. 2012). This follows the notion of relationship marketing which emphasizes stakeholder collaboration and a shift from transactional to sustained relational exchanges (Frow & Payne, 2011). Identifying these stakeholder groups is one of the first steps towards building relationships (e.g. Freeman, 1984; Gummesson, 2002).

According to Frow and Payne (2011), there are various approaches to describe and classify the stakeholders within a network (Christopher et al. 1991; Kotler, 1992; Morgan & Hunt, 1994; Gummesson, 1995; Doyle, 1995; Buttle, 1999; Laczniak, 2006). For example, in the model introduced by Christopher et al. (1991), six categories of stakeholders are identified: customer markets, supplier/alliance markets, internal markets, referral markets, influence markets and recruitment markets. It should be noted that stakeholders represent more than a group of dyadic relationships to be managed (Lozano, 2005), and that the whole entity should be viewed as a network-based model where different parties influence the business of others.

Håkansson and Ford (2002) state that there are three paradoxes relating to business networks: 1) networks provide opportunities but also set limitations for the companies' actions; 2) a network is a way to influence other companies but also to be influenced by others; and 3) within a network, companies try to control others while also being controlled by them. The company's position in the network determines their potential to influence others (Gadde et al. 2003). Each company in a network has a unique position in relation to other actors, but these positions are perceived differently by various actors in the network. It is important for companies to occupy an information-rich position in the network in order to get the most benefits from the relationships and to learn from others. Organizational learning enables the effective use of complementary resources brought into the relationships by different actors (Gadde et al. 2003) and an increase in the organization's intellectual capital.

In conclusion, business companies form networks that are a combination of actors, resources and activities. The value provided for each company is a result of the shared skills, resources, competences, relationships and information. Ford et al. (2011) note the following aspects which relate to business relationships and networks:

- All companies are dependent on their relationships with suppliers, customers, distributors, co-developers and others companies within the network.
- No business relationship exists in isolation and all are connected to others in a network across the business landscape.
- The ability to access the resources and activities of other companies through these direct and indirect relationships is vital for the success of any company.
- All companies are involved in trying to manage the direction and outcomes of their relationships. But no company can completely control its customers, suppliers or other counterparts.

2.1.2 Characteristics of B2B relationships

Compared to single-transaction arrangements, which are typical in consumer markets, continuous transactions within a B2B setting require building a relationship between the supplier and the buyer. According to Turnbull and Valla (2013), one of the most important characteristics of industrial markets is that both parties are active participants in the relationship. These relationships are a result of recurrent personal interaction among individuals from both organizations (Andersen & Kumar, 2006). The nature of the interaction is affected by: 1) how cooperative or non-cooperative the actors are, 2) the actors' perception of their counterparts' trustworthiness and 3) the behavioral dynamic that emerges from the actors perception of each other.

Relationship characteristics refer to the nature and extent of interactions between two parties (Homburg et al. 2003). These can include trust, information exchange and the age of the relationship. According to Homburg et al. (2003), trust can be defined as *"the perceived credibility and benevolence of the supplier as viewed by the customer"* (e.g. Doney & Cannon, 1997; Ganesan, 1994). It is argued that trust is a key determinant of the relationship's strength (Dwyer et al. 1987; Morgan & Hunt, 1994; Doney & Cannon, 1997) and that trust determines whether customers are willing to continue business with their suppliers (Anderson & Weitz, 1989; Morgan & Hunt, 1994; Doney & Cannon, 1997). Building up trust is a social process which takes time and must be based on personal experience (Håkansson, 1982). Having a trustworthy relationship can also increase flexibility and adaptability between the parties and thus strengthen the relationship between the firms (Arino et al. 2001). Adaptations can occur in product or financial arrangements, information routines or social relations and can lead to benefits such as cost reduction, increased revenue or differential control over the exchange (Håkansson, 1982).

The information exchange relates to the assumption that both parties are willing to proactively provide accurate and useful information to their partner (e.g. Heide & John, 1992). This is seen as one of the cornerstones of the interaction process between suppliers and customers, where the exchange of products, services, information, financial and social aspects takes place (e.g. Håkansson, 1982; Grönroos, 2004). Communication processes are even described as the glue that binds inter-organizational relationships (Heide & John, 1992; Joshi & Arnold, 1997, in Andersen et al. 2009). On the other hand, the lack of reciprocal information exchange can lead to information asymmetry and opportunism in relationships.

The relationship's age relates to the fact that relational exchanges evolve over time (Dwyer et al. 1987). As both parties become familiar with one another and are aware of each other's modes of operation the interaction requires less effort. In addition, the age of the relationship affects the perceived trustworthiness of the parties; the more the companies gain good experiences from investing in the relationship, the more they trust each other. And with increased trust the parties are more willing to exchange vital information.

Although business relationships differ from the relations that people have with friends and family, the social aspect of the relationship is still an important factor when building a relationship. Anderson and Kumar (2006) state that it is widely recognized that personal relations play an important role in B2B relationships and that a lack of positive personal chemistry is often the reason why these relationships either never develop or fail to be sustained over time.

A number of characteristics exists that can be used to describe the nature of a business relationship. Barnes et al. (2007) identified 24 attributes related to dyadic relationships, which are presented in Table 1. The dimension of *legitimacy and compatibility* relates to the relationship (trust, reliability, mutuality, shared power) and the quality associated with the supplier's offering (image and reputation). Regarding the *social relations*, professional contacts, closeness and friendship affect the nature and duration of the relationship. It is suggested that customers tend to buy from people that they like and from people who have been endorsed by others (Gordon, 1998). The *economic and shared values* dimension relates to economic investments that have price and cost implications for the parties (co-manufacturing, switching costs, investment stakes and integrated IT) and shared values which represent the extent to which partners share common beliefs concerning behavior, goals and policies (win-win, affection, ownership, relationship depth). *Learning bonds* describe activities for knowledge sharing and learning from each other (staff exchange, training, co-design and NPD, joint research).

When assessing relationship characteristics it should be noted that different factors have an effect on different stages of the relationship. Powers and Reagan (2007) studied the factors that influence successful relationships between suppliers and buyers in various stages. These stages, introduced briefly in Table 2, include partner selection, defining purpose, setting relationship boundaries, creating of value and relationship maintenance. As the process of building a relationship can be highly complex and distinct in reality, this model can be considered rather ideal and rational. It also disregards the phase where companies first learn to collaborate before they can create value for each other. According to their findings, out of 13 tested attributes, having mutual goals was important both in the beginning of the relationship as well as in later stages. Adaptation, where one of the partners changes or adapts their processes or the item exchanged to accommodate the other party, was significantly important in partner selection, creation of value and relationship maintenance stages.

Table 1 *Relationship attributes identified in the literature (adapted from Barnes et al. 2007, p. 664).*

Dimension	Relationship attributes	References
Legitimacy and compatibility	Trust	Wilson (1995); Boles et al. (1996)
	Reliability	Parasuraman et al. (1988)
	Mutuality	Wilson (1995); Gundlach et al. (1995)
	Power (relative)	Anderson & Narus (1984); Hanmer-Loyd (1996); Cho & Chu (1994); Dabholkar & Neeley (1998)
	Quality (Brand image)	Prendergast et al. (1996); Davis & Buchanan-Oliver (1998)
	Quality (Reputation)	Cunningham & White (1973); Ganesan (1994); Blois (1996)
Social relations	Professional contacts	Gummesson (1987); Ward & Reingen (1996)
	Closeness	Ford et al. (1996); Jackson (1985); Dawson (2000)
	Social circles	Day (2000); Ward & Reingen (1996)
	Friendship	Beatty et al. (1996); Barwise (1995)
	Communication extent	Barwise (1995)
Economic and shared values	Co-manufacturing	Ettlie & Ward (1997)
	Switching costs	Heide & John (1988); Jackson (1985)
	Investment stakes	Andersson & Soderlund (1988); Johanson & Mattson (1988); Weitz & Jap (1995)
	Integrated IT	Davis & Buchanan-Oliver (1998); Gordon (1998); Wilson & Vlosky (1998)
	Win-win (reward)	Kumar et al. (1995); Peck et al. (1999)
	Affection	Campbell & Wilson (1996); Barnes (1994)
	Ownership	Håkansson & Snehota (1995); Webster (1992)
	Relationship depth	Ford et al. (1996)
Learning bonds	Staff exchange	Levitt (1983); McIvor et al. (1997)
	Training	Jackson (1985)
	Co-design and NPD	Matthyssens & Van den Bulte (1994); Wilkstrom (1996); Day (2000)
	Exchange of information	Metcalf et al. (1992); Fletcher & Peters (1997)
	Joint research	Berling (1993)

Table 2 *Stages of a B2B relationship (Powers & Reagan, 2007).*

Stage of the relationship	Description
Partner selection	Process of assessing the quality of a potential partner in terms of skills and capabilities.
Defining purpose	Development of a common understanding of the purpose of the relationship in order to clarify mutual goals.
Setting relationship boundaries	Defines the degree to which each partner penetrates the others' organization and achieves joint action.
Creating value	Process by which the competitive abilities of the partners are enhanced by being in the relationship (by means of e.g. technology, market access, information, lower prices and operating costs, knowledge).
Relationship maintenance	The stability of the relationship that has developed as the previous stages have been developed and have been positive outcomes.

In conclusion, there are various factors that can be used to characterize B2B relationships, and the effect of each factor is different in the evolutional stages of the relationship. However, it should be noted that although many business relationships are close, complex and long-term, the parties involved do not know everything about each other or always act in each other's best interest (Ford et al. 2011). Even though suppliers and customers work together to find mutual goals, they often have different ideas of what they want from the relationship or what their counterpart should be doing. By having an open and trustworthy relationship, it is easier to cope with and resolve possible conflicts between the parties.

In this study, B2B relationships are considered close involving continuous transactions where both parties are active participants in the relationship. However, as there are differences in the length of the relationships studied, the amount of trust and previous experiences can also affect whether and how the relationships are maintained.

2.1.3 Organizational buying processes in B2B relationships

As defined by Webster and Wind (1972, p. 2), organizational buying is '*the decision-making process by which formal organizations establish the need for purchased products and services, and identify, evaluate, and choose among alternative brands and suppliers'*. Hutt and Speh (2013) conclude that organizational buying behavior should be considered as a process which involves many actors instead of an isolated act or event. In fact, the interaction process between the supplier and buyer should be considered to consist of episodes which include the exchange of products and services, information, financial and social aspects (Håkansson, 1982). Table 3 demonstrates the various stages of an organizational buying process starting from problem recognition, leading to the selection of an appropriate supplier and ending by reviewing the performance of the selected supplier.

Table 3 *Stages of the organizational buying process (modified from Hutt & Speh, 2013, p. 35).*

Stage of the buying process	Description
Problem recognition	The recognition of a problem or need in the organization which can be met by acquiring a specific good or a service.
General description of need	Preparation of a general need description which describes the characteristics and quantity of required items.
Product specifications	Determination of the items' technical product specifications.
Supplier search	The conduction of a supplier search to find the best offerings that meet the requirements and product specifications.
Acquisition and analysis of proposals	The buyer invites qualified suppliers to submit detailed written proposals, which are then analyzed in order to select a supplier.
Supplier selection	The selection of a suitable supplier and negotiations with them.
Selection of order routine	Preparation of an order routine specification, which includes the final order with the chosen supplier. Includes, for example, list of technical specifications, order amount, expected time of delivery and warranties.
Performance review	Review of the supplier's performance in considering the quality of the delivery, purchased items and service.

Compared to consumer purchases, an organizational purchase usually involves more buyers and more professional purchasing which calls for detailed product specifications, written purchase orders, careful supplier searches and formal approval (Kotler & Armstrong, 1993). The criteria used to evaluate and compare alternative products and services differ among groups of people involved in the decision-making process. The ease-of-use and controllability might be the main criteria for users while the purchasing function is more concerned with cost savings. When taking part in the sales process the supplier must be able to answer three questions (Hutt & Speh, 2013): 1) which organizational members take part in the buying process, 2) what is each member's relative influence in the decision and 3) what criteria are important to each member in evaluating prospective suppliers?

In business relationships, people working in different functions in the customer organization are involved in the buying process (Ulaga & Chacour, 2001). In larger companies, there can be a formal buying center while in smaller companies the decisions can be made in informal groups. In addition to this, the number of people involved in decision-making varies across organizations. It should be noted that these people can have different perceptions on what is valuable for the company, and the final decision can be based on a compromise. There are also other forces that influence organizational buying behavior, such as *environmental forces* (economic, political, legal and technological changes), *organizational forces* (goals, objectives and strategies), *group forces* (roles, relative influence and patterns of interaction of buying decision participants) and *individual forces* (job function, past experience, buying motives of individual decision participants) (Hutt & Speh, 2013).

Comparing consumer transactions with business transactions, the relationship between the parties takes on a bigger role. In an organizational buying process the supplier has a more participatory role, and they may work closely with their customers during all stages of the buying process (Kotler & Armstrong, 1993). The final offering can often be customized to support the individual customer needs. The transaction becomes more than just the exchange of a product or service—it is about exchanging value. This exchange is not only dependent on the people directly involved in the inter-communication but also on the organization as a whole (Kothandaraman & Wilson, 2000). Figure 3 depicts the shift from traditional buyer-seller interaction to a broad interaction in a deep relationship. In the "bow tie" model, the transaction is between the marketing and purchasing functions which channel the communication and resource exchange. In the "diamond" model, the relational exchange involves various value-creating functions that exchange information and resources freely in order to achieve the relationship objectives. It should be noted that the business interaction does not only feature salespeople, marketers and buyers (Ford et al. 2011), but it involves a wide variety of contributions from different functions and individuals in the two companies.

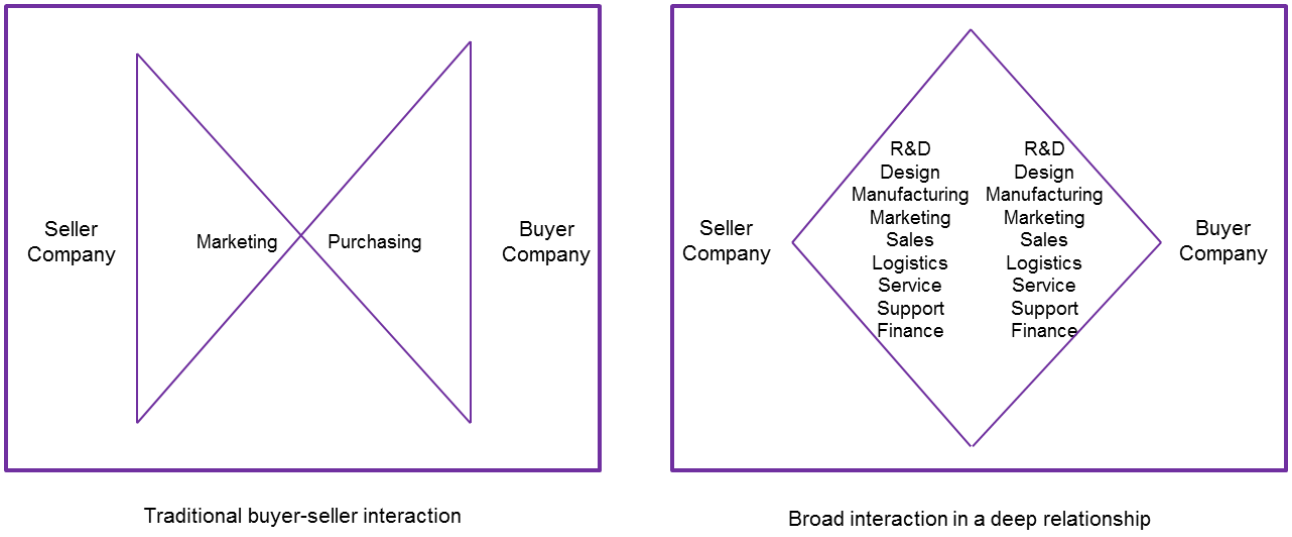


Figure 3 *Schematic representations of firm contact patterns (modified from Hutt and Speh, 1998).*

Industrial purchasing decisions are not always discrete decisions based on the attractiveness of the supplier's offering. It is often a part of a growing commitment to a particular supplier which developed through many years of building a relationship (Turnbull & Valla, 2013). Managing this kind of a business relationship is an ongoing process. As Ford et al. (2011) state, a business relationship is hardly ever a single transaction. It is about multiple interactions between a number of staff including months of initial meetings, negotiations and product development. In this study organizational buying is considered as a process involving multiple actors with various needs that should all be noticed by the supplier when building their customer value proposition. In the following chapter the notion of customer value is examined in more depth.

2.2 Customer value in a B2B context

Customer value has been widely researched from the viewpoint of supplier and customer companies (Lindgreen et al. 2012), especially in marketing and management literature, and it is one of the central research topics in both consumer and business markets. However, the term 'customer value' has been defined in alternative ways in the literature, and there are still no common guidelines on how to measure customer value in a specific context. The purpose of this chapter is to define the concept of customer value as it is used in this research, explain the notion of value in business-to-business markets, explore how value affects technology investment decisions and demonstrate how to form an effective customer value proposition to attract customers.

2.2.1 What is customer value?

Customer value emerged as a defining business issue in the 1990s (Sanchez-Fernandez & Iniesta-Bonillo, 2007) and has been a topic of interest for researchers and practitioners for the last few decades. Huber et al. (2001) state that many marketing strategists and industrial economists emphasize that creation of superior customer value is a key element for ensuring companies' success (Porter, 1996; Kordupleski and Laitamäki, 1997; Woodruff, 1997; Higgins, 1998; Khalifa, 2004). Despite numerous studies considering customer value there is still no general understanding of how to define it. The lack of consensus in the definition is perhaps one of the reasons why the concept of value is one of the most overused and misused concepts in management literature (Khalifa, 2004).

One of the earliest attempts to conceptualize customer value was made by Zeithaml (1988). In her definition value was described as follows: *"perceived value is the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given".* This definition includes the following notions acquired from a study with consumers: 1) value is low price, 2) value is whatever I want in a product, 3) value is the quality I get for the price I pay, and 4) value is what I get for what I give. Some of these notions can be considered ambiguous; for example, the first notion suggests that anything that is inexpensive is valuable, which can only be realized in the consumer markets. However, there are some fundamentally accepted viewpoints in Zeithaml's work as well. Her definition already makes the distinction that customer value is a trade-off between benefits and sacrifices which is used as a basis for many following definitions.

In the Merriam-Webster dictionary value is defined (related to this context) as: 1) a fair return or equivalent in goods, services or money for something exchanged; 2) the monetary worth of something; 3) relative worth, utility or importance; or 4) something (as a principle or quality) intrinsically valuable or desirable. Often enough the word 'value' is related to monetary units which leads the value discussion to the price of products and services.

Ravald & Grönroos (1996, pp. 21-22) note that, including the price that the customer pays for an offering, the customers' costs also include other acquisition costs, transportation, installation, handling of the order, spare parts and maintenance costs. According to their view, the customers' total expense should include all costs during the product life-cycle and not just price. Huber et al. (2001) differentiate costs in terms of monetary costs, time costs, search costs, learning costs, emotional costs, and cognitive and physical effort coupled with financial, social and psychological risks. Khalifa (2004) notes that besides benefits and sacrifices a supplier can provide negative added value by creating complicated systems with non-user-friendly technology, having unfriendly or unskillful employees, late deliveries, delayed maintenance of equipment and so forth.

Anderson and Narus (1998, p. 6) also include the aspect of monetary worth in their definition of value: *"value is the worth, in monetary terms, of the technical, economic, service, and social benefits a customer company receives in the exchange for the price it pays for the market offering".* However, the transformation of all benefits into monetary worth is not always straightforward and simple. It can be difficult or even impossible to evaluate, for example, the social benefits received from maintaining a relationship with a supplier. Smith and Nagle (2005, p. 41) define the economic value as the *"product's objective monetary worth to a customer adjusted for the availability of competitive substitute products."* It should be noted that the value of an offering is usually related to corresponding products.

Woodruff (1997) combines these abovementioned definitions by stating that *"customer value is a customers' perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations".* It binds together in a value hierarchy model the customers' goals and purposes, desired consequences in use situations, and desired product attributes and attribute performances. The judgment of value is therefore a result of a trade-off in positive consequences or desired outcomes and negative consequences or costs (Khalifa, 2004). This is recognized as a more comprehensive definition than earlier ones (Payne & Holt, 2001), and it is considered useful to both executives involved in customer value determination and researchers interested in refining the theory of customer value (Parasuraman, 1997).

Customer value can also be defined by the object that creates value. According to recent marketing literature, two major research streams can be distinguished: 1) the value of goods and services, and 2) the value of buyer-seller relationships (Lindgreen & Wynstra, 2005; Lindgreen et al. 2012). The research on product and service value is usually based on the distinction of benefits and sacrifices. However, customer companies do not only do business to obtain value of the good or service (Håkansson, 1982; Reichheld, 1994), but they also value the reputation, location, innovativeness and future capabilities of a supplier (Lindgreen et al. 2012). Future capabilities refer to the thought that if the supplier is perceived as capable of doing business in the future the customer does not need to anticipate the change of a supplier. This type of relationship value exceeds the actual product or service being exchanged. This refers especially to large informational products, such as

control systems, that have high switching costs and where the value of the purchase can only be analyzed after the product is taken into use (Williamson, 1985; Pollock & Williams, 2009).

In long-term business relationships the benefit concept takes on a deeper meaning, including aspects such as safety, credibility, security, continuity, et cetera (Ravald & Grönroos, 1996). These aspects increase the trust in the supplier and encourage customer loyalty. The value of a relationship should also be taken into account in addition to the value of an offering. Research conducted by Palmatier (2008) suggests that customer value is based on three relational drivers: relationship quality (the caliber of relational ties, such as trust and commitment), contact density (the number of relational ties) and contact authority (the decision-making capability of relational contacts). Ulaga and Eggert (2006) identified service support, personal interaction and supplier's know-how as the most important differentiating factors considering benefits gained from the relationship with a key supplier. The value drivers in these relationships are demonstrated in Table 4. However, this model does not consider e.g. transaction or switching costs, which are also an important part of the overall relationship value assessment.

Table 4 *Value drivers in key supplier relationships (Ulaga & Eggert, 2006, p. 122).*

	Relationship Value Dimensions	
Sources of Value Creation	**Benefits**	**Costs**
Core Offering	Product Quality Delivery Performance	Direct costs
Sourcing Process	Service Support Personal Interaction	Acquisition costs
Customer Operations	Supplier know-how Time to market	Operation costs

Whether it is the offering or the relationships that creates value, customer value is typically considered a dynamic concept since the value perceived may change over time. The value drivers may differ in the initial purchase, the use right after the purchase and over long-term use (Flint et al. 1997; Woodruff, 1997). For example, the value of service and consulting may decrease as the user gets more experiences with the product (Van der Haar et al. 2001). It is generally agreed that customer value is determined by the customer's perception as opposed to the assumptions or intentions provided by the supplier (e.g. Zeithaml, 1988; Woodruff & Gardial, 1996; Anderson & Narus, 2003; Khalifa, 2004). Because of this, suppliers should gain insight from their customers to understand the benefits and costs considered in the buying decision (Miller & Swaddling, 2002).

Customer value can also be observed on different levels. Butz and Goodstein (1996) differentiate three levels of customer value: 1) the expected level, 2) the desired level and 3) the unanticipated level. On the expected level the supplier provides those goods and services which the customers

are expecting based on what is normal or typical for that specific business or industry. On the desired level customers wish for features which can add value but are not expected because of industry standards. The third and highest level of customer value is the unanticipated and unexpected level. At this level the supplier succeeds in offering value which is beyond the customers' expectations or desires. In order to be superior in creating value for the customers, suppliers should aim at reaching the unexpected level and differentiate themselves by providing, for example, unusually prompt service.

In this study the definition of customer value is adapted from the work of Woodruff (1997) and Ravald and Grönroos (1996). Customer value is therefore perceived from the customers' perspective, and it is context dependent—related to the use of products or services and an overall evaluation of how the product and the relationship with the supplier enables the achievement of the customers' goals and purposes.

2.2.2 Understanding customer value in B2B markets

Value is recognized as one of the cornerstones of business market management (Anderson & Narus, 1998) and a strategic focus point for technology-based companies (Van der Haar et al. 2001). There has been a shift in the business focus; instead of selling products, suppliers aim to provide value for their customers. Since it is difficult for suppliers to compete based on technical features and quality alone, it is critical for supplier companies to understand how their offerings create value for their customers (Woodruff & Gardial, 1996; Parasuraman, 1997; Woodruff, 1997).

Van der Haar et al. (2001) introduced a model (see Figure 4) to illustrate the differences in value perceptions from the customer's and the supplier's viewpoint. In the beginning of a product development process there might only be vague ideas of what value the supplier company intends to offer to its customers based on the supplier's perceptions on what the customers need. This is defined as the intended value. The focus here is to match the intended value with the customers' actual desires and needs, i.e. desired value. An information gap may occur between these values if the supplier has insufficient information of the customers' needs and requirements. There is also a risk that the supplier might focus on false needs due to misinformation.

After the development process the product is created and introduced to the marketplace. At this stage the value of the product is referred to as the designed value from the supplier's perspective. A design gap may occur if the designed and intended value differ based on technical restraints or miscommunication between marketing and R&D. The customers' have to choose between products in the marketplace that best match their expectations. The expected value for the offering can differ from their original desires. The smaller this compromise gap is between desired and expected value, the better chance for the supplier to gain new customers. After the purchase and usage customers will evaluate the value they received. The satisfaction gap reflects the gap between the expected and the received value.

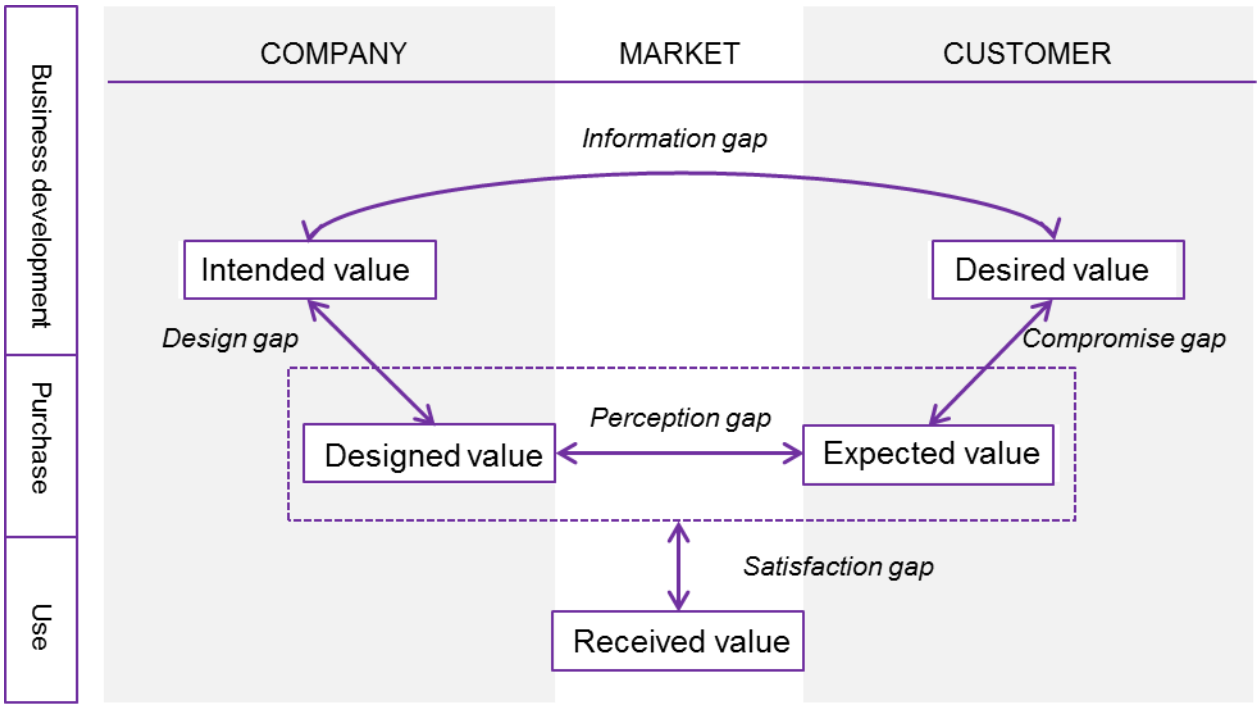


Figure 4 *The customer value model (Van der Haar et al. 2001).*

In order to reduce these gaps, especially in the suppliers' and customers' perceptions, it is important for suppliers to know how to gain insight on customer perceived value. The reason why customer satisfaction measurement is not sufficient enough is because customer satisfaction rates can only be gained from current customers, whereas value can be perceived by former, present and potential customers (Gale, 1994; Eggert & Ulaga, 2002). Customer value measurement can be regarded as a strategic marketing tool to clarify a supplier company's position to its customers (Ulaga & Chacour, 2001).

According to Butz and Goodstein (1996), there are five steps in the process of understanding customers: 1) customer identification, 2) planning the data collection, 3) collecting the data, 4) measurement, and 5) implementation. Since the investment decision process typically involves different members of an organization, it is essential to capture the value perceptions of key informants involved in the process. Woodruff and Gardial (1996) identify three categories of people in a business organization who experience the value of an offering. The first category is the users, such as assembly-line workers or project managers, who use the product to perform their job. The insight gained from these individuals will reveal whether the product provides value in use.

Another category is the decision makers and decision influencers, such as purchasing agents or managers. These individuals determine the selection criteria for the product specifications and requirements as well as supplier qualifications. However, they usually have very little or no hands-on experience with the product itself and may be more concerned with meeting financial objectives

than specific performance criteria of the product. From the supplier's perspective, it is important to understand the product's relationship with the customers' overall business as well as the usage situations.

Customer value measurement can be conducted in various ways. Understanding the use value as well as the user experience might require observational techniques. By observation it is possible to determine how the product is used by the customer, what the positive and negative outcomes of that use are and how the specific use situation requirements affect the value of the product (Woodruff & Gardial, 1996). Another option is to gather qualitative data by conducting in-depth interviews. Although it might be considered expensive and time-consuming, this is an effective way to get a deeper understanding of customer value perceptions and to identify the actual value drivers. By identifying potential gaps in the value perceptions between suppliers and customers, it is possible to provide products and services that better fit the needs of current and potential customers. Thus, by providing greater value to customers, a supplier company can gain competitive advantage. However, this requires an understanding of the technology investment decision criteria.

When it comes to purchasing and investment decisions, value plays a critical role from the customers' point of view on which supplier to select. Early studies on value were conducted in the field of marketing regarding how value is related to purchasing behavior (e.g. Gutman, 1982; Zeithaml, 1988). For instance, Gutman (1982) claims that consumer values play a dominant role in guiding purchase choice patterns. The effect of hedonic and utilitarian goals on purchase decisions has also been studied in consumer research (e.g. Batra & Ahtola, 1990; Dhar & Wertenbroch, 2000; Okada, 2005). For example, Okada (2005) found that people who were presented simultaneously with a hedonic or pragmatic option chose the pragmatic option even though the hedonic option was valued more. Hassenzahl (2007) concludes that people may focus on the pragmatics of a product (e.g. usability) and put less value on the hedonic aspects (e.g. beauty) even though the ugliness can drastically impact the later product experience. However, on some occasions people are also willing to pay a premium for a 'memorable experience' (Pine & Gilmore, 1998).

Compared to consumer markets, other value aspects can determine the criteria for technology investment decisions in the B2B industry (Ahola et al. 2008). The benefits can be product related (product performance, reliability, quality and customization), delivery related (on-time delivery, flexibility of delivery), service related (product-related services, training programs, after-sales services) or relationship related (image, trust, mutual goals). On the other hand, the sacrifices can include direct costs (price), indirect costs (delayed deliveries, repair and maintenance) and transaction costs (time, effort, energy, installation; coordinating and communicating with the supplier) (Ravald & Grönroos, 1996; Lapierre, 2000; Cannon & Homburg, 2001; Möller & Törrönen, 2003; Ulaga, 2003). The benefits can also be derived from positive UX, which can be regarded as a part of customer value in the entire product lifecycle. The challenge for the supplier is to identify which benefits and sacrifices are the most prominent value enablers or disablers.

Anderson et al. (1993, 1998, 2000) state that value expresses in monetary terms the total functionality or performance of a product offering in a given customer application. According to their view, each product has two characteristics: its value to the customer and its price. Although it is acknowledged that value and price are the most critical determinants for selecting a supplier, it is not yet known how these characteristics are evaluated when making an investment decision and what is considered valuable to the customer company.

In addition, it is not apparent how the changes in value and price affect the investment decision. Changes in value can occur in two ways (Miles, 1989): an offering can provide the same functionality while its cost to the customer changes (excluding price), or the functionality can change while the cost remains the same. Anderson et al. (2000) notes that even if the functionality is lower than in previous offerings, it can still meet or exceed the customer's minimum requirements. It depends on what type of functionality is needed in the customer's application. However, Lindic and da Silva (2011) state that it is not the features or characteristics of a product that affects decision-making but the benefits that result from the product usage. Changing the price does not change the value of an offering but affects the customer's incentive to purchase that offering (Anderson & Narus, 1998). Anderson et al. (2000) state that purchasing managers more often use price and price changes as a basis for selecting offerings than value and value changes, since value is seen as a more ambiguous concept than price.

Despite this, price is not usually considered the most important selection criterion (Van der Haar et al. 2001). In business markets the economic value of an offering, which estimates the cost, revenue and profit consequences of alterative offerings, is considered the dominant criterion in decision-making (Corsaro & Snehota, 2010). The value of an offering can increase in two ways (Anderson et al. 2000): by increasing the total cost savings (resulting from lower acquisition costs, conversion costs or disposal costs) and through superior performance in reference to the predetermined specifications.

Liu et al. (2005) noted that in exclusive business exchange relationships the customers' choice of supplier is based on the perceived costs and benefits attained from the relationship (Morgan & Hunt, 1994), satisfaction with the exchange partner (Ganesan, 1994) and the customer's trust towards and dependence on the supplier (Anderson & Weitz, 1989). Kotler (2003) states that customers do not always choose the offer with the highest value but can base their decision on other factors. In some cases a business customer is obligated to buy at the lowest price. If the customer company is enjoying a loyal relationship with a supplier, they might continue to buy from this supplier regardless of the value delivered (Lindgreen et al. 2012).

Thus, the value of a relationship is an important aspect in decision-making, as is suggested also by Ravald and Grönroos (1996). They state that *"in a close relationship the customer probably shifts the focus from evaluating separate offerings to evaluating the relationship as a whole."* Although there can be corresponding offerings from competing suppliers, a previous business relationship

can have a significant effect on the customers' choice of supplier. In some cases, other suppliers might not even be considered if the customer company is pleased with the current supplier's product and service offerings compared to total costs. One of the reasons for maintaining a relationship with the same supplier is the perceived switching costs, which is especially high for informational products. The investment size in a relationship especially affects its continuation (Liu et al. 2005).

Because the relationship with a supplier can be a deal-breaker in investment decisions, it is essential for suppliers to gain and maintain a good relationship with their customer companies. It should also be noted that customers do not assess individual suppliers and their offerings separately, but instead they consider the fit with other current or planned suppliers and their products (Strandvik et al., 2011).

In this study, value in business markets is considered a complex issue, as value 1) can be perceived differently from the customer's and supplier's viewpoint, 2) requires active measurement in order to provide the right kind of offerings for customers, 3) has to be identified for different stakeholders, such as users, project managers, and purchasers, and 4) affects the customers' purchase decisions. Thus, it is important for suppliers to understand what creates value and what is perceived valuable for different stakeholders in a customer companies in order to properly fit these needs.

2.2.3 Constructing a customer value proposition

One way of demonstrating the type of value a supplier company is offering to their customers is by constructing a value proposition. According to Lindic and da Silva (2011, p. 1694), *"a value proposition describes how a company's offer differs from those of its competitors and explains why customers buy from the company".* In Webster's definition (1994, p. 25) the value proposition is a verbal statement that: 1) matches the firm's distinctive competencies with the needs and preferences of customers, 2) is a communication device which links employee efforts with customer expectations, and 3) creates a shared understanding in order to form a long-term relationship that meets the goals of the supplier and the customer. According to Rintamäki et al. (2007, p. 624), a customer value proposition should be more than just a brand slogan, it should:

- increase the benefits and/or decrease the sacrifices that the customer perceives as relevant;
- build on competencies and resources that the company is able to utilize more effectively than its competitors;
- be recognizably different (unique) from its competition; and
- result in competitive advantage.

In addition, they suggest that the definition of a value proposition should be based on the positive consequences of the attributes since they express the value-in-use to the customers. One of the difficulties in developing an effective value proposition is how to prove to customers that the claims of increased savings and other benefits are actually valuable for them. If a value proposition is properly constructed it will force the supplier companies to focus on the reality of what their offerings are worth to their customers (Anderson et al. 2006).

Although there is no consensus on how a value proposition should be constructed, there exist several approaches to defining this matter in the literature (e.g. Kambil et al. 1996; Lanning, 1998; Osterwalder & Pigneur, 2003; Anderson et al. 2006; Rintamäki et al, 2007). One of the most comprehensive approaches to defining the distinctions between different value propositions is found in the work done by Anderson et al. (2006). They identify three types of value propositions based on the suppliers' viewpoint. These are classified as all benefits, favorable points of difference and resonating focus. A summary of these propositions is provided in Table 5.

Table 5 *Customer value propositions (Anderson et al. 2006, p. 93).*

Value proposition	All benefits	Favorable points of difference	Resonating focus
Consists of:	All benefits customers receive from a market offering	All favorable points of difference a market offering has relative to the next best alternative	The one or two points of difference (and, perhaps, a point of parity) whose improvement will deliver the greatest value to the customer for the foreseeable future
Answers the customer question:	"Why should our firm purchase your offering?"	"Why should our firm purchase your offering instead of your competitor's?"	"What is the most worthwhile for our firm to keep in mind about your offering?"
Requires:	Knowledge of own market offering	Knowledge of own market offering and next best alternative	Knowledge of how own market offering delivers superior value to customers, compared with next best alternative
Has the potential pitfall:	Benefit assertion	Value presumption	Requires customer value research

A value proposition in its most simple and commonly-used form lists all the benefits that the supplier believes their offering delivers to customers. This method requires the least effort and knowledge of competitors' offerings or customers' requirements. The problem is that supplier companies often think of value propositions in terms of what they offer as opposed to what their customers consider valuable (Bower & Christensen, 1995; Kim & Mauborgne, 1999; Christensen & Overdorf, 2000, Anderson et al. 2006).

Regarding the favorable points of difference, the value proposition focuses on communicating the value of an offering compared to other alternatives. This approach requires deep knowledge of competitors' offerings as well and an understanding of how it differs from the supplier company's own offering. However, without knowledge on which aspects of an offering are of value to the customers, the supplier might end up stressing points of difference that provide relatively little value for the customers.

The third and last value proposition in this model is resonating focus. This approach provides a value proposition that is both simple and captivating for the people involved in investment decisions. It offers details of carefully selected points of difference with competitors' offerings that are truly valuable for the customers. Crafting a value proposition of resonating focus requires customer value research in order to have enough insight on what is important from the customers' perspective. As concluded by Lindic and da Silva (2011), customers do have options and companies need to differentiate themselves through analyzing their competitors' offerings and the needs of target clients.

The customer value proposition should also include the experience that the supplier company would like their customers to have when doing business with them (Selden & MacMillan, 2006). Berry et al. (2002) argue that in order to include experience in a value proposition, organizations should manage the emotional component of experiences in the same manner as product and service functionality management. In order to do this, suppliers should also gain insight on what kind of experience is valuable for the customer.

The value proposition can also be utilized as a strategic tool from the supplier's point of view. Internally, the value proposition identifies the value drivers the company offers and the activities involved in producing this value (Walters & Lancaster, 1999). Since the company has determined how they will provide value for their customers, they can use it as a guideline to allocate resources and direct efforts in R&D to match the customers' needs. Rintamäki et al. (2007) argue that a customer value proposition helps managers align operations, human resources, marketing communications and the whole business model around the creation of real customer value.

Although constructing a value proposition is considered an effective method of communicating the value of an offering to customers, it is rarely used in business strategy. In research conducted by Frow and Payne (2008), 265 managers were surveyed on the topic and as a result the term 'value proposition' was used in 65 per cent of the organizations, but only eight per cent had developed and routinely communicated a formal value proposition. One practical way of composing a value proposition is by co-producing it with customers. Ballantyne et al. (2011) suggest that a value proposition should be a reciprocal promise of value, transparent about to whom the intended value should flow and how, delivered over a time frame longer than a single transaction, and be co-created through an interaction between two or more parties.

In conclusion, the customer value proposition should state the value of a supplier's offering in relation to competition. It should also reflect what customers find valuable and include the experience that the supplier company would like their customers to have when doing business with them. However, it should be noted that depending on the type of technology, the contents of a value proposition can vary. For example, for a company that supplies wear parts, the most important aspects for the customer might be the durability and price of the products and the reliability of the supplier. On the other hand, companies providing informational products such as Enterprise Resource Planning systems have more long-term relationships with their customers and the actual system and value proposition is more customer-specific. Thus, these types of suppliers are more willing to co-create their value offering together with users and customers. Gaining a key supplier status can require a lot of resources, but it is less expensive to maintaining a relationship with current customers than acquiring a new or lost customership.

2.3 User Experience

User experience is recognized as a central focus of interest among academics and practitioners during the last decades. As a result of this, industrial companies have recently devoted more time and emphasis on UX issues by, for example, hiring UX Designers to improve their offerings. This chapter focuses on defining the concept of UX with a brief description of the historical roots of usability and UX research. In addition, the role of UX in new product development is introduced along with the focal methods exploited in this study for evaluating user experience.

2.3.1 From Usability to UX research

The progression towards studies on user experience started from usability research in the field of human-computer interaction (HCI) in the late 1970s. Today, usability engineering is one key element in product development, which is widely recognized as a critical factor for the success of an interactive system or product (Arhippainen, 2009, p. 56). Various definitions exist for the concept of usability. The International Standards Organization (ISO 9241-11, 1998) identifies three aspects of usability, defining it as *"the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use".* Efficiency and effectiveness are product characteristics that can be objectively evaluated, whereas satisfaction is the subjectively experienced positive or negative attitude resulting from the use of a product (ISO 9241-11, 1998). This means that usability is not only the result of ease-of-use, but it is also influenced by the functionality and reliability, as well as the suitability, of the hardware, user and task (Bevan, 1999, p. 6). According to Nielsen (1994, p. 26), one of the leading web usability experts, usability is multi-dimensional and traditionally associated with five usability attributes, which are presented in Table 6.

Table 6 *Usability attributes (Nielsen, 1994, p. 26).*

Usability attributes	Definition
Learnability	The system should be easy to learn so that the user can rapidly start getting some work done with it.
Efficiency	The system should be efficient to use, so that once the user has learned to use the system, a high level of productivity is possible.
Memorability	The system should be easy to remember, so that the casual user is able to return to the system after some period of not having used it, without having to learn everything all over again.
Errors	The system should have a low error rate, so that users make few errors during the usage, and so that if they do make errors, they can easily recover from them. Catastrophic errors must not occur.
Satisfaction	The system should be pleasant to use so that users are subjectively satisfied when using it.

This definition highlights the fact that, in addition to being satisfying, a usable product or system should be easy to learn and memorize, and also have a low error rate, so that the user can be efficient in their work. Another definition by The Usability Professionals Association (UPA) focuses more on the product development process: *"Usability is an approach to product development that incorporates direct user feedback throughout the development cycle in order to reduce costs and create products and tools that meet user needs"* (Tullis & Albert, 2008, p. 4).

If developing the product usability is neglected in the product design process it can lead to manufacturing products that are difficult to use and complicated to operate. On the other hand, the benefits of good usability are easy to derive for both the customer and the supplier companies. Maguire (2001) summarizes the benefits as increased productivity (less time learning the tool and completing tasks), reduced errors, reduced training and support, improved acceptance (people would rather use products that are informative, easy to use and helpful in completing their tasks) in the customer company and enhanced reputation for the supplier as the feedback of good UX reaches potential customers.

Usability research has traditionally focused on objective measurements of how users perform tasks with an interactive product. These kinds of measurements include task execution time and the number of clicks or errors (Vermeeren et al. 2010). UX has received attention in recent years, especially as a countermovement to the dominant, task- and work-related usability paradigm (Hassenzahl & Tractinsky, 2006, p. 91). According to Kaye (2007), UX focuses on the lived experiences while using the product instead of the task itself, as in usability testing. UX also focuses on the hedonic qualities of use, such as aesthetics (Tractinsky et al. 2000) and self-actualization (Hassenzahl, 2003).

However, already in the early usability writings it was noted that the primary focus of usability is the person's experience at that moment instead of notions such as productivity or learnability (Whiteside & Wixon, 1987 in Hassenzahl & Tractinsky, 2006). Tullis and Albert (2008, p. 4) make the distinction by stating that usability is usually considered the ability of the user to use a product to carry out a task successfully, whereas UX takes a broader view by looking at the individual's entire interaction with the product, including the thoughts, feelings and perceptions that result from that interaction.

It has also been noted that even a product with good usability can cause negative experiences or dissatisfaction among users. However, a product with significant usability problems can also have a great sales success and satisfied users (Jokela, 2004). This is why it is important to understand experience in a broader manner and to identify the factors which lead to a good user experience.

Research on UX has mostly been conducted in the consumer markets focusing on consumer-related products and systems (e.g. Bargas-Avila & Hornbaek, 2011). Although studies on usability focused first on systems in the context of work, there is still a lack of knowledge about UX in the

B2B context (Väätäjä et al. 2014). Few empirical studies have been reported considering UX in the work domain (Buchner et al., 2012; Harbich and Hassenzahl, 2008; Obrist et al., 2011; Vuolle et al., 2008; Väätäjä, 2010a, 2010b). The following chapters focus on defining the UX concept and demonstrating its importance in designing new products.

2.3.2 The concept of UX

Despite the growing interest in UX, difficulties have arisen in gaining a common agreement on the nature and scope of UX (e.g. Law et al., 2009). Although the UX concept has been adopted by both practitioners and researchers in the field of HCI, it has also been critiqued as being vague and elusive (Hassenzahl & Tractinsky, 2006). According to Law et al. (2008, p. 2396), *"UX is seen as something desirable, though what exactly something means remains open and debatable"*. One reason for this is that UX is associated with several indistinct and dynamic concepts such as emotional, affective, experiential, hedonic and aesthetic variables (Forlizzi & Battarbee, 2004). In addition, there are various theoretical models considering UX which are employed in the field depending on the author's background and interest.

As an early attempt to define UX, Alben (1996) describes experience as: 1) the way the product feels in the user's hand, 2) how well the user understands how the product works, 3) how the user feels about the product while using it, 4) how well the use of the product serves their purposes and 5) how well the product fits into the entire context of use. This approach explains the aspects that influence experience in the interaction of the user and the product.

In order to reach a more unified definition for UX, The International Organization for Standardization (ISO 9241-210, 2010) defines the term 'user experience' as a *"person's perceptions and response resulting from the use and/or anticipated use of a product, system or service"*. This definition includes the following notations:

- *User experience includes all the user's emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviors and accomplishments that occur before, during and after use.*
- *User experience is a consequence of brand image, presentation, functionality, system performance, interactive behavior and assistive capabilities of the interactive system, the user's internal and physical state resulting from prior experiences, attitudes, skills and personality, and the context of use.*
- *Usability, when interpreted from the perspective of the user's personal goals, can include the kind of perceptual and emotional aspects typically associated with user experience. Usability criteria can be used to assess aspects of user experience.*

This definition points out the fact that experience is affected by the know-how, feelings and previous experiences even before and after the use. In accordance with this definition, Vermeeren et al.

(2010) note that UX is something that can be evaluated after interacting with an object, but also before and during the interaction. UX is also highly subjective and context-dependent. The context of use includes the physical environment, social aspects, technology, tasks and the user (Hiltunen et al. 2002). Hassenzahl and Tractinsky (2006) combine these characteristics in their definition of UX*: "It is a consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) in which the interaction occurs (e.g. organizational/social setting, meaningfulness of the activity, voluntariness of use, etc.)."*

The different aspects of UX can be classified into instrumental and non-instrumental aspects (e.g. Mahlke, 2008; Zimmermann, 2008) — or pragmatic and hedonic aspects, respectively (Hassenzahl, 2003). The pragmatic aspect focuses on how the product supports the achievement of "do-goals" which are considered as task-oriented, relating to the product's utility and usability in completing tasks (Hassenzahl, 2007). On the other hand, hedonics refers to the product's ability to support the attainment of "be-goals". Hedonic quality aspects may include beauty (i.e. aesthetics) (Alben, 1996; Tractinsky et al. 2000), surprise, diversion and intimacy (Gaver & Martin, 2000).

Three sub-dimensions for hedonic aspects are defined as identification (i.e. self-expression, interaction with other relevant individuals), stimulation (i.e. personal growth, an increase of knowledge and skills) and evocation (i.e. self-maintenance, memories). Individuals tend to express themselves through the possession and use of physical objects which is why technical products should be able to communicate and reflect their identity (Zimmermann, 2008). The products should also be stimulating in order to provide personal development, new impressions, opportunities and insights. Evocation, on the other hand, means that products can evoke memories. Therefore, the product can represent past events or relationships that are important to the individual.

In addition to the pragmatic and hedonic aspects, another frequently mentioned line of UX studies is the focus on emotions and affective responses that people experience while interacting with products (Norman, 2004; Hassenzahl & Tractinsky, 2006; Rogers et al. 2011). As Forlizzi and Battarbee (2004, p. 264) states: *"Emotion is at the heart of any human experience and an essential component of user-product interaction and user experience".* Emotions are often shaped by social context, and the emotional experiences change in different environments or in the presence of different people and artifacts. Zimmermann (2008) notes that the importance of emotions for a wide range of central processes, such as decision-making, perception, cognition, learning, social judgment or behavior, has been acknowledged (e.g. Forgas, 1995; Picard, 1997; Russell, 2003).

According to Hassenzahl and Tractinsky (2006), there are two basic ways of measuring emotions in UX: emotions as consequences of product use (e.g. Kim & Moon, 1998; Desmet & Hekkert, 2002; Hassenzahl, 2003) or as antecedents of product use and evaluative judgments (e.g. Singh & Dalai, 1999; Norman, 2004). Research has been conducted on how interactive systems can manage frustrations and prevent negative emotions (Cockton, 2002), as well as on the positive emo-

tional outcomes such as joy, fun and pride. The emotional reaction that occurs when using a technological device is often measured with psychophysical techniques (e.g. Mandryk et al. 2006).

In this study, the definition of The International Organization for Standardization (ISO 9241-210, 2010) is used with acknowledgement that UX is comprised of pragmatic, hedonic and emotional aspects.

2.3.3 Designing experiences for users

Understanding experience is a critical issue, especially in designing new products (Forlizzi & Battarbee, 2004). Designing products with improved UX seems to be a requisite: if the use of a product evokes negative experiences among users it will hinder the product's success on the market. In business markets there is an increasing demand for products that match the users' real needs in the working environment. The idea of "designing user experience" has been embraced by designers, business people, interaction design firms and e-business strategy providers (Forlizzi & Ford, 2000). However there are still difficulties in understanding how people actually interact with different artifacts and form experiences. More information on how interaction and product design achieve specific UX goals is needed.

There have been debates about whether it is possible to design a user experience. According to Hassenzahl (2001), the correspondence between the intended and perceived quality of a product can be low (Kurosu & Kashimura, 1995), expressing the differences in how the designers and users experience a product. Because of this, the product characters are only intended by the designer and there is no guarantee that the user will perceive and appreciate the product the way the designers intended. The design itself does not contain usability or UX; this is experienced by the user. By understanding how products are used in a work context and eliminating aspects that lead to negative feelings such as frustration, it is possible to create a positive experience for users by designing a product that fits their needs.

Understanding experience is difficult and designing UX for interactive systems is even more complex (Forlizzi & Battarbee, 2004). Because of this, it is vital to understand the user's expectations and how they influence product use and experience. Expectations are derived from e.g. previous use situations with similar products, the perceived brand image of the company and a person's skills in using interactive products. Since these traits are usually personal, subjective and hidden, it creates challenges for the designers to develop products that offer a positive UX for people with different backgrounds.

In order to design products that fit the needs of users, the design focus must shift from a product-centric approach to a human- and user-centric point of view. According to the standard of human-centered design for interactive systems (ISO 9241-210:2010), using a human-centered approach in product design and development has substantial economic and social benefits for the users,

employers and suppliers. It also states that highly usable systems and products tend to be more successful, both technically and commercially. Using human-centered methods improve the quality by:

- *increasing the productivity of users and the operational efficiency of organizations;*
- *being easier to understand and use, thus reducing training and support costs;*
- *increasing usability for people with a wider range of capabilities and thus increasing accessibility;*
- *improving user experience;*
- *reducing discomfort and stress;*
- *providing competitive advantage, for example by improving brand image; and*
- *contributing towards sustainability objectives.*

The concept of user-centered design (UCD) can be seen as a philosophy as well as a process (Mahlke, 2008). It takes the view in which the user is at the center of the design process rather than the product. It also focuses on the human factors which arise during peoples' interaction with technical artifacts. Utilizing a user-centered model helps the designers understand the people who will use the products in a work context (Forlizzi & Battarbee, 2004).

Introducing a process of successful user-centered design in an organization requires cultural and technical change as well as strategic commitment. Bevan (1999) identifies four activities that need to take place at all stages of a design process in order to create better user experiences. These include 1) understanding and specifying the context of use, 2) specifying the user and organizational requirements, 3) producing design solutions and 4) evaluating these designs against the requirements. According to Sward (2007), the challenge is how to partner UCD with other business disciplines in order to drive the approach throughout the organization so that it becomes embedded in the business strategy and develops the basis for all the company's actions.

Sward (2007) also argues that *"the user's experience is the outcome of a user-centric design process: not a design process in itself".* All of the supplier's activities affect how users experience the product as well as the supplier company itself. UX can be viewed from the following elements: 1) marketing and awareness, 2) acquisition and installation, 3) product or service use, 4) product support, and 5) removal or end-of-life. In the first stage, the marketing and brand awareness focuses on the image portrayed before the use of a product by means of, for example, advertisement and staff interaction. Acquisition and installation include elements such as first-time setup, integration with other solutions and billing. Providing an undemanding and error-free installation effects how the supplier is perceived in terms of delivery reliability. Problems in the installation phase might create a negative attitude towards the use of the product or system. The product use has the strongest bond in terms of UX, but the product support — including training, support, updates, problem resolutions and ongoing maintenance — can also have a major impact on the experience.

The last phase in this model resembles the final interaction of the product and possibly the first experiences with a new replacement product.

Although this model is designed mainly for consumer markets, these components are still valid in the B2B markets. However, in these different stages the targets of the experience might vary. For instance, the brand awareness and acquisition of the product might not be experienced by the actual users, but the use of the product and product support are highly linked to the users' experience.

Hartson and Pyla (2012) introduced a model for the lifecycle of UX design. According to their work, the UX design should be carried out in four stages: analysis, design, implementation and evaluation. The analysis phase focuses on understanding the user's work and needs. By using this information in the design phase it is easier to create conceptual designs which can then be formulated into prototypes in the implementation phase. In a larger system view, implementation also includes a final production of hardware and software. In the evaluation phase the process and the final product are analyzed to see whether the design meets the user's needs and requirements. This lifecycle is illustrated in Figure 5.

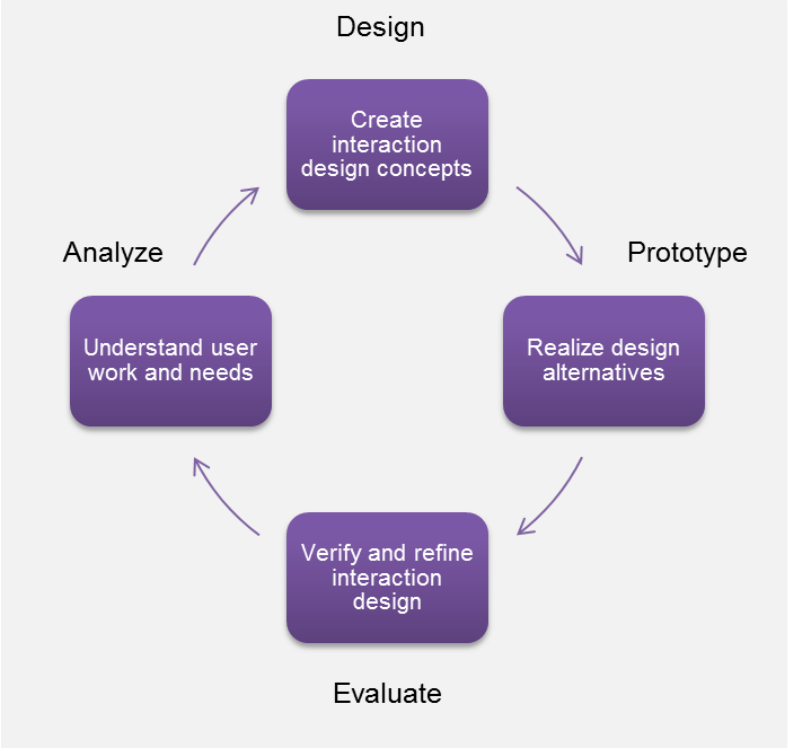


Figure 5 *The Lifecycle for UX design (Hartson & Pyla, 2012).*

The entire lifecycle, especially prototyping and evaluation activities, is supplemented and guided by UX goals, metrics and targets. According to Rogers et al. (2011), desirable UX goals can include creating an enjoyable, exciting, motivated, challenging, fun product that supports creativity. These goals can be considered as subjective qualities concerned with how a system feels to a user as

opposed to objective usability goals (e.g. effectiveness, efficiency, safety). It is important to choose the right kind of UI and UX goals in the early stages of design work. It is also important to realize that not all combinations of goals are compatible. For instance, it may not be possible or even desirable to design a process control system that is both safe and fun. Recognizing and understanding the relationships between usability and other user experience goals is essential in interaction design.

Developing new products with better UX requires the participation of various stakeholders including users, customers, sales, marketing and maintenance. User involvement is especially important in order to identify the users' needs and requirements, understand what emotions are important for them in interaction and to anticipate their expectations. In fact, active user participation is considered as one of the key principles in user-centered system design (Gulliksen et al. 2003). According to Kujala (2003, 2008) user involvement is a widely accepted principle in the development of usable systems. The benefits gained from user involvement were recognized early on in research (see e.g. Robey & Farrow, 1982; Damoradan 1996).

Findings from a variety of studies show that users' effective involvement in system design yields the following benefits: 1) improved quality of the system gained from more accurate user requirements; 2) avoidance of costly system features that the user does not want or cannot use; 3) improved levels of system acceptance; 4) a greater understanding of the system, resulting in more effective use; and 5) increased participation in decision-making with the organization. However, it should be noted that acquiring user information is not a purpose itself, since the user interfaces can be highly standardized or the designers possess enough information to make decisions in NPD (Hyysalo, 2009). The important thing is to assure that the acquisition of user information supports the NPD goals.

Most usability experts consider it a requisite to get feedback directly from the actual users and a lack of user involvement has been associated with, for example, failed software projects (Kujala, 2003; 2008). Although a wide range of positive effects are recognized considering user involvement, the role of the users has to be carefully considered. According to Kujala (2003), the user's role in product development can be defined in various ways. In participatory design the users play an active part in many design activities. However, in other approaches users can be involved as providers of information, commentators or objects for observation.

Kujala (2008) suggests that the most natural and successful means of user involvement in product development is informative and empowered. This means that it is essential that product developers are active in gathering information and feedback directly from representative users. Users should also be active in their role of an informant in order to build a unified view with the developers considering the needs and values of users. In addition, the most significant time for user involvement occurs in the beginning of the product development process. It is essential that product development is based on users' needs while also taking the use context into consideration.

There are also challenges in getting customers and users to participate in the design process or doing customer research (Miller & Swaddling, 2002). First of all, it is considered time-consuming, and many industries are challenged to decrease their cycle time in NPD. Second, conducting research requires resource investments and adds expenditures. In many cases, existing resources are allocated to these projects, making it difficult to manage customer research alongside with other usual work tasks. Despite the possible downsides, conducting research and involving users in the development process ultimately benefits the supplier company by decreasing the risks of producing the wrong type of products which the customers and users will not accept.

In addition to involving external parties in the product development process, other divisions inside the supplier company should also be considered. For example, since salespeople are in close contact with customers (Kotler et al. 2006) and they have a strong customer orientation (Homburg & Jensen, 2007), sharing information with R&D and marketing should provide better insight into customer and user needs (Ernst et al. 2010). Prior research identifies the integration of marketing and sales with R&D as a key success factor in new product development (e.g. Gupta et al. 1986; Souder, 1988; Griffin & Hauser, 1996; Song et al. 1998). This collaboration is found especially important in the concept development stage. It should be noted that marketing and sales have different orientations in their work; marketing focuses more on the product while sales concentrates more on the customer (Homburg & Jensen, 2007). Because of this, sales has a stronger link to individual customers whereas marketing holds information considering customer segments and has a more strategic focus on the whole product business.

In conclusion, the involvement of different parties is considered an essential part of NPD. R&D should find ways to actively involve people who have insight into what customers and users need in order to complete their work and have a good experience in using a product or system. However, the involvement of various parties should be executed in a cost-efficient manner to receive the maximum benefit out of inter- and intra-organizational cooperation. In this study, employing a user-centered design process is considered an essential part of NPD and one of the research focuses is to investigate whether UX is utilized in the case companies NPD processes.

2.3.4 Methods for measuring UX

In order to improve existing products, the supplier company has to find methods to evaluate how their offerings are perceived and experienced among users and customers. According to Bevan (2008), usability measurements are commonly used in product development in order to understand the users' needs and improve the product to obtain a better user experience. It is also important from R&D's view to have specific UX goals in the design and development processes and means to evaluate whether the goals have ultimately been achieved and if these goals were selected correctly according to the users.

There are at least two types of UX/usability measures: those that measure the result of using the whole system, and measures of quality of the user interface (Bevan, 2008). The measurement might consider the user's pragmatic goals (to be effective and efficient) and/or hedonic goals (stimulation, identification, evocation). Even though UX is considered the actual experience of usage, this is often difficult to measure. However, it is possible to measure the consequences of the user's performance — for example, the satisfaction in achieving the pragmatic and hedonic goals. It should be noted that in evaluating user experience, straightforward usability tests are not sufficient enough to measure the experience of use. In order to evaluate UX, Kaye & Taylor (2006) propose five guidelines that should be taken into account:

1. *A detailed and rich description of the users' experiences is needed in order to understand and appreciate the complexity of the lived experience.*
2. *The situation in which the technology is used needs to be recognized.*
3. *There are many stakeholders involved in the use of a technology, apart from the actual users, which need to be identified. Their experiences need to be evaluated as well.*
4. *The values of these different people need to be understood. These values influence the way in how the technology is experienced, and they may be local and situated rather than universal.*
5. *It should be recognized that there is going to be ambiguity in the characterization of people's experiences. This ambiguity should not be eliminated but rather embraced in order to provide better and richer descriptions of experience.*

In order to measure user experience and usability, one has to identify the typical users of the software, the goals they typically wish to achieve and the technical, physical and organizational environments in which the work is carried out (Macleod, 1996). One way to learn about the user experience of a product is to ask the users to share their experience. This kind of data provides information about the users' subjective perceptions of the product and their interaction with it, including how they feel about the product. However, there is difficulty in finding a suitable way to measure this experience. For this purpose various self-reported metrics were invented which include rating scales, lists of attributes and open-ended questions. Vermeeren et al. (2010) collected multiple UX evaluation methods in order to understand the current state of all available methods. In this section, only the methods that will be later utilized in this study (method explained in chapter 3.3.2., see Bargas-Avila & Hornbaek, 2011) are presented.

The Self-Assessment Manikin (SAM) has been designed to measure the affect in user experience. It is a non-verbal pictorial assessment technique that directly measures the pleasure, arousal and dominance associated with a person's affective reaction to a wide variety of stimuli (Lang, 1980; Bradley & Lang, 1994) (see Figure 6). It is constructed with three sets of graphical manikins, each of which represents five states from happy to unhappy, excited to calm and from being in control to being controlled. Individuals rate their feeling either on a manikin or in the space between two manikins, which results in nine graduations per dimension (Zimmermann, 2008).

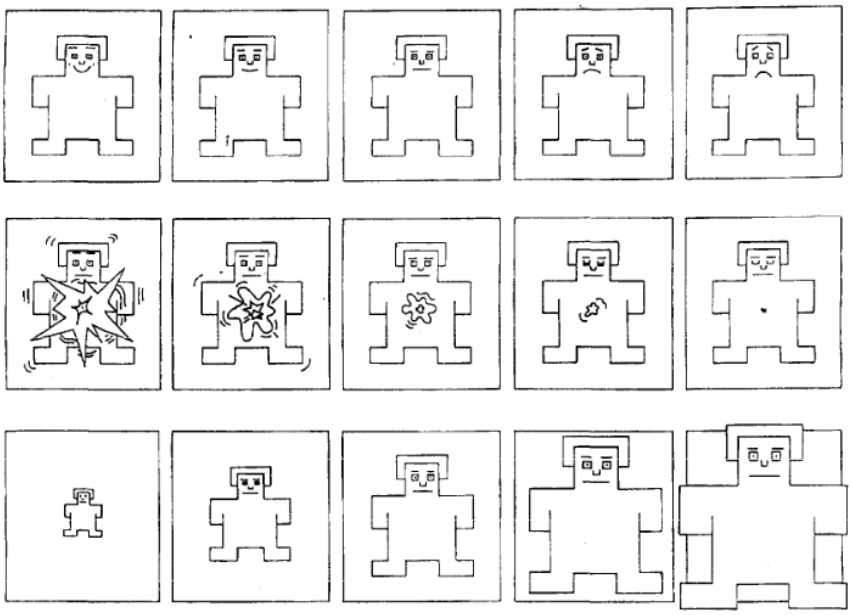


Figure 6 *The Self-Assessment Manikin (SAM) (Bradley & Lang, 1994).*

SUMI (Software Usability Measurement Inventory) was developed to provide a standardized measurement of the system's quality of use from the viewpoint of a typical user (Kirakowski, 1996, p. 169). It can be used for the evaluation and comparison of products (or versions of a product) and to set and track verifiable targets regarding satisfaction. The measurement tool consists of fifty attitude statements, each of which the user may respond to with 'agree', 'don't know' or 'disagree'. In SUMI there are five usability subscales: Affect, Efficiency, Helpfulness, Control and Learnability. SUMI analysis also provides a "global" satisfaction score. Typical phrases in the measurement tool include (Mahlke, 2008):

- *I feel in command of this software when I am using it.*
- *Learning how to use new functions is difficult.*
- *I would not like to use this software every day.*
- *I would recommend this software to my colleagues.*
- *It is obvious that user needs have been fully taken into consideration.*

To extend the measurement of UX to account for more than just usability ratings, Hassenzahl et al. (2003) invented the AttrakDiff survey, which is used to define the users' feelings towards a system they are using. It is based on the division of hedonic and pragmatic quality attributes of user experience (see Table 7). Pragmatic quality is related to users' ability to achieve goals with the product, whereas hedonic quality is about how motivating, interesting and identifiable the product is to users. In this method a semantic differential technique is used, where 23 word-pairs considering the quality of use are evaluated with a Likert-scale. The survey enables conducting a longitudinal study and comparing the results before and after use and also comparing two different products/services.

Table 7 *UX quality attributes in AttrakDiff.*

UX quality attributes	Word-pair	
Hedonic quality – Identification	Isolating	Integrating
	Amateurish	Professional
	Gaudy	Classy
	Cheap	Valuable
	Non-inclusive	Inclusive
	Takes me distant from people	Brings me closer to people
	Unpresentable	Presentable
Hedonic quality – Stimulation	Typical	Original
	Standard	Creative
	Cautious	Courageous
	Conservative	Innovative
	Lame	Exciting
	Easy	Challenging
	Commonplace	New
Pragmatic quality	Technical	Human
	Complicated	Simple
	Impractical	Practical
	Cumbersome	Direct
	Unpredictable	Predictable
	Confusing	Clear
	Unruly	Manageable
Evaluational constructs	Ugly	Beautiful
	Bad	Good

The AttrakDiff, visual aesthetics and SAM measurement tools were widely used in measuring user experience in the literature review conducted by Bargas-Avila and Hornbaek (2011). It should be noted, however, that selecting a suitable measurement tool depends on the UX goals; if the goal is to design a product which helps the user be highly efficient in their work, task-oriented usability metrics are probably in place.

Compared to the previous scales, Lavie and Tractinsky (2004) take a different approach and strive to measure the visual aesthetics of computer interfaces. According to them, the visual aesthetics are a strong determinant of users' satisfaction and pleasure. Their study indicates that user's perceptions consist of two main dimensions: "classical aesthetics" and "expressive aesthetics" (see Table 8). The dimension of classical aesthetics emphasizes orderly and clear designs which are

closely related to several design rules supported by usability experts. The expressive aesthetics dimension accentuates the designer's creativity and originality in designing new user interfaces.

The visual aesthetics scale of Lavie and Tractinsky is often used in assessing websites and interactive technological devices (e.g. Hartmann et al. 2008a; Hartmann et al. 2008b; Mahlke & Thuring, 2007). A 7-point Likert scale ranging from (1) "strongly disagree" to (7) "strongly agree" is typically used with this scale.

Table 8 *Dimensions and attributes of visual aesthetics (Lavie & Tractinsky, 2004).*

Dimensions of visual aesthetics	Attributes
Classical aesthetics	Aesthetic design Pleasant design Clear design Clean design Symmetric design
Expressive aesthetics	Sophisticated design Creative design Fascinating design Use of special effects

Although various established UX measurement instruments exist, they are not designed to measure the importance of UX-related attributes. Because of this, a survey instrument is constructed based on the use of these above-mentioned metrics. The survey design is presented in detail in Chapter 3.4. Data and methods.

2.4 The value of experiences in the B2B context

Business-to-business relationships can be perceived as the basis of all business (Ford et al. 2011), combining the actors, resources and activities of different parties (Håkansson & Johanson, 1992; Håkansson & Snehota, 1995) in order to create value by having access to relevant knowledge and other resources (Fjeldstad et al. 2012) within a network of companies. The interaction between suppliers and customers includes the exchange of products, services, information, and financial and social aspects (e.g. Håkansson, 1982; Grönroos, 2004). B2B relationships are usually described as long-term and complex, requiring mutual trust between the participating companies.

Previous studies note that the creation of superior customer value is a key element for ensuring companies' success (Porter, 1996; Kordupleski and Laitamäki, 1997; Woodruff, 1997; Higgins, 1998; Khalifa, 2004) and that creating value should be the cornerstone of all business (Anderson & Narus, 1998). Woodruff's definition (1997) addresses well how value is dependent on the use-situation and is an evaluation of the product attributes, attribute performances and consequences arising from use. However, value is not only obtained from the goods or services provided by the supplier, but the reputation, location, innovativeness and future capabilities of a supplier also can be perceived as valuable (Lindgreen et al. 2012). In this study customer value is perceived from the customers' perspective; it is context dependent, related to the use of products or services and an overall evaluation of how the product and the relationship with the supplier enables the achievement of the customers' goals and purposes.

There is a rising notion that instead of offering value by means of products and services, suppliers should provide superior experiences to their customers (e.g. Meyer & Schwager, 2007; Payne et al. 2008; Rintamäki et al. 2007; Johnston & Kong, 2011; Löytänä & Kortesuo, 2011, Löytänä & Korkiakoski, 2014). Similar issues emerge in understanding value as well as experiences: they are both ambiguous concepts and perceived subjectively. Because of this, suppliers have to put effort into understanding what kind of experiences their customers find valuable.

Considering the value of an experience, two distinct categories must be distinguished: customer experience and user experience. Customer experience (CX) occurs every time a customer interacts with a supplier company and their offerings (Rintamäki et al. 2007). Meyer and Schwager (2007, p. 118) define CX as *"the internal and subjective response customers have to any direct or indirect contact with a company"*. UX is defined in this study as a *"person's perceptions and response resulting from the use and/or anticipated use of a product, system or service"* (ISO 9241-210, 2010). Creating a positive UX for the actual users is related to value-in-use — the value a user gains from a positive experience with the product. According to Payne and Holt (2001), value-in-use is considered a functional outcome or a goal purpose which is realized directly by product use (Burns & Woodruff, 1992; Holbrook, 1994; Woodruff & Gardial, 1996) and contributes towards accomplishing a work task (Wilson & Jantrania, 1994). In this respect the user is perceived as the

person who interacts with the product in their work, whereas the customer is the person who interacts with the people at the supplier company and is involved in making the decision to buy the product.

Creating superior customer and user experiences is regarded as an emerging enabler for differentiation (Gebauer et al. 2005; Meyer & Schwager, 2007; Verganti, 2011). In order to be successful, supplier companies must be able to create value for the users as well as valuable and positive experiences for their customers. In a literature review on customer value carried out by Khalifa (2004), it was stated that the value that matters the most is the value of the customer's experience and not the value of the product (Lanning, 1998). Also, the customer's resulting experience should be the essence of a value proposition (Berry et al., 2002; Selden & MacMillan, 2006) which describes how the supplier's offering differs from competitors and why the customer should buy from the supplier (Lindic & da Silva, 2011). This is also supported by MacDonald et al. (2011) who argue that value is realized in actual use, not only in exchange, and that value-in-use should also be a part of the customer value proposition.

By focusing the discussion of value on the value-in-use for the customer, the focus shifts from regarding value as a customized bundle of products or services exchanged for a price (Grönroos & Voima, 2013) to seeing value creation as an ongoing process that stresses the customer's experiences and the ability to gain value from product use. The term 'user value' has also been brought up in previous research (Boztepe, 2007; Park et al. 2011; Park & Han, 2013). For example, Park et al. (2011) proposed that usability, affect and value are key components of UX. In this context, user value is a distinct concept from life value or product/service value. Life value can be defined as desirable states of existence (e.g. freedom, equality, salvation) or modes of behavior (e.g. self-control, honesty, generosity) (Park & Han, 2013). On the other hand, user value is the accomplishment of these states of existence or modes of behavior by the use of a certain product or service. The product/service value is a subjective preference for and evaluation of the offering that facilitates achieving the user's life value. According to this definition, user value is a result of user experience. However, the values presented by Park and Han (2013) differ greatly from what users experience while interacting with a product at work or what customers value in a business relationship.

It has also been noted in previous studies (MacDonald et al. 2011) that the value perceived by B2B customers has multiple levels (e.g. Van der Haar et al. 2001; Rugg et al. 2002). In its simplest form, these levels can be classified into individual and organizational goals. For example, an IT (information technology) solution can be regarded as making a person more efficient at completing work tasks (individual goal), helping their organization maintain its competitive advantage (organizational goal) and increasing the person's job security (individual goal) (Rugg et al. 2002). The task then is to identify what type of goals the organization holds and the goals of the individuals working for the organization, which is something that providers fail to recognize at the moment. It should also be noted that different users can experience value from using a specific product in different ways

(Strandvik et al. 2011) which adds to the difficulty of understanding comprehensively what creates value for specific customers. Research conducted by MacDonald et al. (2011) notes that managers' assessment of value was based on observing impacts on the factory floor, emphasizing the importance of assessing both corporate and individual levels of value. As Woodruff previously stated (1997), a richer customer value theory is needed that examines the customers' product use in different situations.

The fact that value can be perceived from multiple levels in a customer organization must also be considered when trying to understand the customers' buying process. As noted earlier, an organizational purchase usually involves more buyers and more professional purchasing which calls for detailed product specifications, written purchase orders, careful supplier searches and formal approval (Kotler & Armstrong, 1993). Different parties involved in decision-making might have different criteria for the purchase. The ease-of-use and controllability might be the main criteria for users while the purchasing function is more concerned with cost savings. It should also be noted that purchasing decisions are not always based on the attractiveness of the supplier's offering. It is often a part of a growing commitment to a particular supplier that developed through many years of building a relationship (Ravald & Grönroos, 1996; Turnbull & Valla, 2013). From the supplier's perspective, it is important to understand the product's relationship with the customers' overall business as well as the usage situations (Woodruff & Gardial, 1996).

In order to provide superior experiences for customers and users, suppliers have to conduct extensive research to understand what is required from their products, services and modes of operation. Two types of research should be conducted to gain insight from both viewpoints: customer value measurement and UX research. Both topics can be addressed with, for example, observational techniques or qualitative in-depth interviews. Although these methods might be considered time consuming and expensive, they provide a deeper understanding of the experiences that customers and users have or would want to have in the future.

Understanding experience is a critical issue, especially in designing new products (Forlizzi & Battarbee, 2004). Designing new products with improved UX seems to be a requisite: if the use of a product evokes negative experiences among users, it will hinder the product's success on the market. On the other hand, highly usable products tend to be more successful both technically and commercially. In order to design a good UX, the supplier has to understand the context of use which includes the physical environment, social aspects, technology, task and the user (Hiltunen et al. 2002). It should also be noted that the users have both pragmatic task-oriented goals as well as hedonic be-goals (Hassenzahl, 2007) which should be taken into account in the design process. By having specific UX goals and targets (Rogers et al. 2011) and applying a human-centered design approach, the supplier can increase the likelihood of completing the design project successfully and meeting the stakeholders' requirements. It is important to include these stakeholders (e.g. customers, users, maintenance, sales and marketing) in the design process so that R&D has requisite knowledge in order to design desired experiences.

Sward (2007) states that *"UX is the derived value from interaction(s) with a product/service and the supporting cast in the context of use (e.g. time, location and user disposition)"*. However, value (particularly customer value) and user experience are concepts that have not been traditionally connected in research. Although it has been acknowledged that customer value can be a result of well-designed customer experiences (Rintamäki et al. 2007), not much is reported regarding how good user experiences affects the perceived value for the customer. Väätäjä et al. (2014) made a first attempt to illustrate how UX and customer value link to each other based on the work of Jumisko-Pyykkö (2011), Mahlke & Thüring (2007) and Woodall (2003). However, in this research, the focus is on the role of UX in different interactions in a B2B relationship. The aim is to identify what kind of value a good UX has in supplier and customer operations.

The value of providing positive experiences for customers and users can be assessed from different viewpoints (Woodruff & Gardial, 1996). First of all, it is beneficial for the user to have a product that provides a good UX in their work. It can increase the users' productivity, be easier to understand and use, and reduce discomfort, stress and possible sick-leave resulting from the use of a non-ergonomic product. From the customer's perspective, having satisfied and productive workers can increase the organization's operational efficiency and enable cost-savings since there is less need for training or substitutes. From the supplier's viewpoint, providing better user and customer experiences may result in more satisfied and loyal customers and profitable long-term relationships. However, it is difficult to prove the causality between these links. For example other aspects than bad ergonomics can lead to sick-leaves which makes it hard to prove that products with good UX automatically lead to a reduction in sick-leaves and additional costs for the company.

In Figure 7 the benefits of good UX are illustrated from the viewpoint of customers, suppliers and users. The focal point of the illustration is that the needs and requirements of customers and users should influence the development process of new products. According to the literature, providing superior value should be the basis of all business. Customers expect results from the purchased equipment from their suppliers, which is why the increase in productivity and efficiency and savings in time and effort are usually aspects that customers are looking for when making technology investment decisions. By focusing on designing better UX it is also possible to provide improved results for customers. The improved UX, work outcomes and results for customers and users should affect the selection of a UCD process. This is illustrated with dashed arrows in Figure 7.

On the other hand, by applying a UCD strategy the supplier can improve the experience for the user by developing a product that is easier to use and learn, includes increased safety and ergonomics, and reduces errors. By improving the UX, the work outcomes are also improved including increased job satisfaction and work performance and reduced amount of stress, discomfort and frustration. All of this leads to the initial goal, which was to increase the productivity of the customer company and savings in costs and time. By providing better experiences than competitors the supplier also gains benefits through increasing customer satisfaction and sales, enhancing their reputation and brand image, and ultimately gaining competitive advantage.

In addition, by applying a UCD process the supplier can improve the process and outcomes of new product development. Focusing on UX design actions makes it possible to improve product quality and also meet the functional requirements defined by customers and users. This enables improved product acceptance among users which leads to benefits for both the customer and the supplier company as the sales increases. As a conclusion, the design and provision of positive UX should be considered valuable from the viewpoint of all three stakeholders since they can all benefit from it.

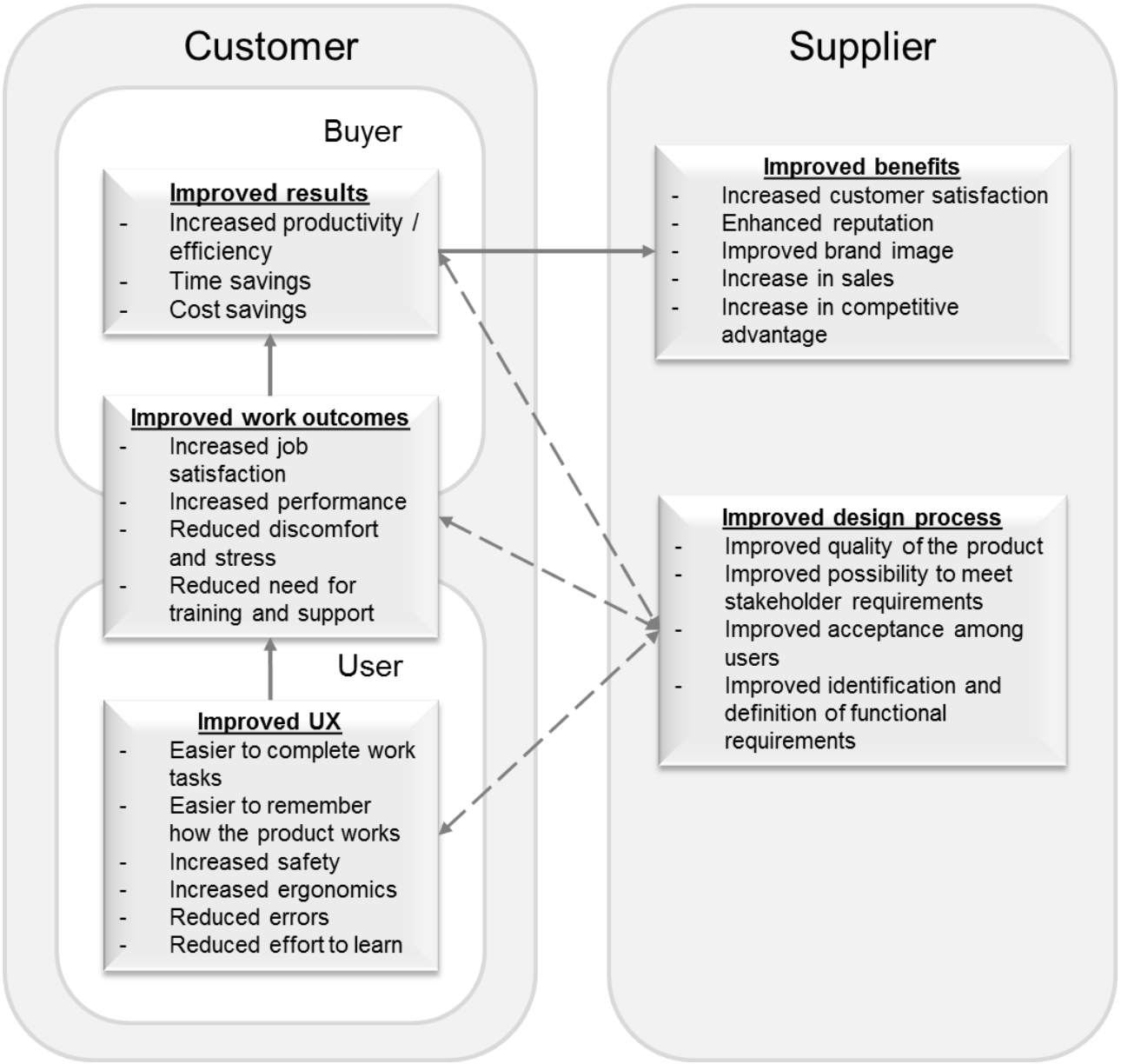


Figure 7 *The benefits of UX for different stakeholders.*

3 RESEARCH DESIGN AND METHODOLOGY

In this chapter the design and methods considering the empirical research are described and the research process considering the data collection and analysis are presented. First, the selected research strategy and the underlying research philosophy are defined. Second, the research design and selection of the research context is explained. Third, the data and methods of both qualitative and quantitative data collection are presented, including an illustration of the research process as a whole.

3.1 Research strategy and philosophical assumptions

The selection of the research strategy started from examining the research questions: what is the focus of the study and with what measures could the questions be answered. Although other strategies — such as survey or grounded theory — were contemplated for conducting this research, adopting the case study research strategy seemed the most suitable in order to investigate UX in B2B relationships. According to Gummesson (1993), the general reason for doing case study research is to better understand complex phenomena. Since there are many factors and different employee groups involved in this study with entangled interconnections between them, simple and unambiguous research designs could not be exploited.

Case study is a research strategy that focuses on understanding the dynamics present within single settings (Eisenhardt, 1989, p. 534). According to Benbasat et al. (1987, p. 371) a case study's strengths include, for example, being able to 1) examine the phenomenon in a natural setting, 2) collect data by multiple means, 3) examine one or few entities (person, group or organization), 4) intensively examine the complexity of the unit of analysis, 5) answer questions such as 'why' and 'how' to get more in-depth knowledge of the studied phenomenon. Selecting a case study research strategy also allows focusing on particular types of technology and creating detailed knowledge of specific contexts. In addition, the case study research allows changes in site selection and data

collection methods during the research process, which is especially convenient in a situation where the studied variables are still unknown and the phenomenon is not yet understood in the beginning of the research. In addition to being able to study complex phenomena, one of the main reasons for selecting the case study research strategy was the versatility of the approach. It enabled the application of different research methods which were most suitable for reaching the sub-objectives of the research. Working in the UXUS program also offered the resources and opportunity for conducting case research in a timely manner.

Social studies usually reflect a philosophy of either positivism or interpretivism (Gummesson, 1993; Saunders et al. 2009). The question of paradigm is defined as the basic belief system or worldview that guides the investigation, not only in choices of method but in ontologically and epistemologically fundamental ways (Guba & Lincoln, 1994, p. 105). Considering positivism, the researcher's view of the nature of reality (ontology) is objective and independent of social actors. According to this view '*only observable phenomena can provide credible data and facts'* (Saunders, 2009, p. 119). The data usually consists of highly structured and large samples of quantitative data. On the other hand, a researcher with an interpretivist paradigm considers reality to be socially constructed and subjective. The paradigm advocates that there are differences between humans and their perceptions. This kind of research usually involves small samples of qualitative in-depth investigations.

Guba and Lincoln (1994) argue that the question of paradigm which is applicable to one's research is more important than the methods used in the research. They note that both qualitative and quantitative methods may be used appropriately with any research paradigm. According to Fletcher and Plakoyiannaki (2011) the case study method can be either interpretivist or positivist by nature (Hyde, 2000), offering flexibility considering the sampling choices, the number of cases and sampling techniques.

In addition to positivism and interpretivism, there is also the paradigm of pragmatism which relates to the use of mixed methods. Pragmatism argues that the most important determinant of the epistemology, ontology and axiology one adopts is the research question — one may be more appropriate than the other for answering particular questions (Yardley & Bishop, 2008). The mix of different approaches has the advantage of enabling triangulation (Denzin, 1978), which can enhance the credibility of the research (Guba, 1981; Shenton, 2004). Four different ways of triangulation were proposed: 1) the use of a variety of data sources (data triangulation), 2) the use of several different researchers (investigator triangulation), 3) the use of multiple perspectives to interpret the triangulation (theory triangulation) and 4) the use of multiple methods to study a research problem (methodological triangulation).

The research paradigm reflected in this study follows mostly pragmatism since there are both qualitative and quantitative methods utilized in this study. However, considering the ontological assumption, this study leans more towards the notion that 'truth' is constructed subjectively. Expe-

rience and value can be considered abstract concepts which are constructed or developed naturally within people's minds (cf. Chamberlain, 2006, the concept of business strategy). These constructs may develop either unconsciously or through no planned or specifically identified cognitive process. In other words, the research deals with people's subjective perceptions of the matter under investigation; it is how the interviewees perceive UX in their work or what they consider valuable in a relationship or a product.

3.2 Research design

After selecting the case study research strategy the next issue was the determining of the unit of analysis. According to Fletcher and Plakoyiannaki (2011) the definition of the unit of analysis is the fundamental answer to the question 'what to select'. In making this selection the researcher must decide on the unit that they want to be able to say something about as a result of the study (Patton, 2002).

This study employs a multiple-embedded case study design (Yin, 1994). An embedded case study design means that there are multiple units of analysis within a case. In this study, the top unit of analysis is the supplier-customer relationship and the role of UX perceived in it. In order to tackle this subject, multiple units of analysis have to be taken into consideration first. As depicted already in the research objective (see Figure 1) from the supplier side, there are two units of analysis: the people involved in the R&D of the product and people involved in the S&M activities of the product. By studying these units it is possible to identify the role of UX in the supplier's activities. From the customer side, the unit of analysis is the people involved in the technology investment decision. Concentrating on this unit of analysis it is possible to investigate the criteria for technology investment decisions and how UX is perceived in them. The last unit of analysis consists of the product users and developers. The focus is to determine the importance of UX-related factors for these groups and investigate whether their perceptions differ or coincide of one another. The units of analysis and their research objectives and methods are presented in Table 9.

Conducting a multiple case study means that these units of analysis are studied in different contexts. According to Herriot and Firestone (1983), the evidence from multiple cases is often considered more compelling and the overall study is therefore regarded as being more robust. In this study there were three cases focusing on the relationship of one supplier company and two customer companies. The supplier companies were from different industries and the nature of their products also varied; companies A and C designed informational products such as automation systems and company C produced physical products for the materials-handling industry.

Table 9 *Units of analysis.*

Unit of analysis	Research objectives / sub-objectives	Method	Observational units
Supplier-customer relationship	The role of UX in B2B-relationships	All below	No of participants
Supplier: R&D	The perception and role of UX in product development processes	Qualitative interviews	15 (5:5:5)
Supplier: S&M	The perception and role of UX in sales and marketing activities	Qualitative interviews	14 (5:5:4)
Customers: people involved in the technology investment decision	Criteria for technology investment decisions and the role of UX in them	Qualitative interviews	9 (3:2:4)
Supplier: R&D Customer: users of the products	The importance of UX-related factors in product development and the use of products	Surveys	R&D: 33 (9:8:16) Users: 28 (9:9:10)

When it comes to selecting companies for a case study, Patton (2002) recommends that the selection involve purposeful, rather than random, sampling. The benefits of purposeful sampling lie in selecting information-rich cases for in-depth studies; studying information-rich cases yields insights and in-depth understanding rather than empirical generalizations. Especially considering the supplier companies, the cases were selected based on an information-oriented selection in order to maximize the information utility from a small sample (Flyvbjerg, 2006, p. 426). In other words the cases were selected based on the expectations about their information content.

In the case company selection the research plan was presented in detail to the contact persons of the companies. The purpose of this was to ensure that: 1) the company was interested in the topic and willing to participate in the study, 2) the company is able to find the right persons to be interviewed and provide rich information considering the research topics, 3) the company could provide customer companies for the study that are able to specify the criteria for their technology investment decisions and 4) both parties would benefit from the results of this study.

One of the most important criteria was that the companies would be able to discuss UX on multiple organizational levels and have a common interest in designing better UX for their customers. The study started with one supplier company that had just launched a new product and was starting deliveries to customers. A study (Väätäjä et al. 2014) was conducted in the company in 2011 by other researchers. The results of this study indicated that the company had knowledge considering the topics that were of interest in this dissertation.

After conducting the interviews with the first supplier it came to our attention that another company in the program was dealing with similar issues. Because of the expected information content gained from this company, it was selected as the second case company. Since there were similarities identified in the results of the first two cases as well, a third case company was selected with a

different kind of product development process. In the first two cases the suppliers' products were radically new and their development process differed from previous projects. Because of this, the third case was selected in order to study an incremental development process and compare whether the role of user experience would be any different.

The customer companies in each case were selected with the help of interviewed salespeople from the supplier companies. The criterion for choosing these companies were that they 1) had purchased the product of the supplier in recent years, 2) had considered other suppliers as well in the investment decision, 3) would be able to specify their criteria for the selection of the product/supplier, and 4) would be willing to participate in both the qualitative and quantitative study. Figure 8 illustrates the structure of the embedded case study design.

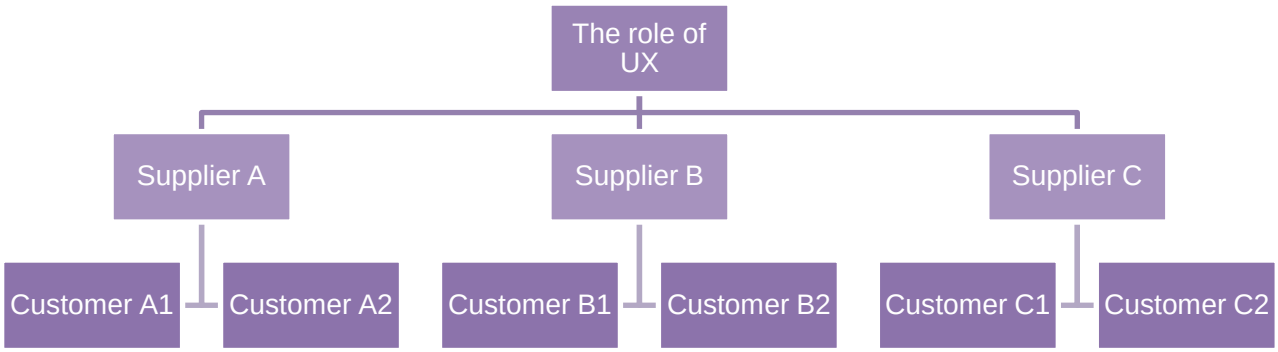


Figure 8 *Embedded case study design.*

Basic information about the companies' industry and number of employees are presented in Table 10. In order to keep the companies and products unidentifiable only the number of people working in different functions and the number of customer deliveries are provided.

Table 10 *Basic information of target companies.*

	Supplier A	Supplier B	Supplier C
Industry	Automation	Materials handling	Automation
No of people in R&D	16	9	120
No of people in S&M	Direct sales: 30 Marketing: 4	Direct sales: 23 Dealers: 400 Marketing: 6	Direct sales: 150 Marketing: 10
No of customer deliveries for case specific products	120	100	4000

3.3 Data and methods

This section demonstrates the collection and analysis of both qualitative and quantitative data. In addition, the composition of the survey for the quantitative part of the study is explained in detail.

3.3.1 Qualitative data

According to Gummesson (1993, p. 33), *'using qualitative interviews is the most common way of generating data in case study research'*. It was also the main method used in this study since interviews were found to be the most appropriate way to explore the phenomenon of user experience from the suppliers' and the customers' perspective. Regarding the suppliers, people from R&D, training, sales and marketing were interviewed. From the customers' point of view, the people directly involved in the technology investment decisions were selected for interviews.

The selection of the informants in the supplier companies was based on referral sampling, where the contact person at each company was asked to nominate suitable informants. The main criterion in the informant selection was their involvement in either the R&D, sales or marketing process of the product under investigation. Snowball sampling was also used in the selection process (Patton, 2002). The purpose of this was to confirm that all information-rich key informants could be reached. The interviewees were asked for other potential interviewees who were involved in the previously mentioned processes. However, the same persons came up in the discussions, indicating that the most suitable people from the supplier companies were included in the study.

The interviewees that worked in sales were asked for suitable customer companies that could participate in the study. From all supplier companies, two customer companies were selected for the study. In order to identify the people involved in investment decisions, the interviewed salespeople were asked for the contact persons in the customer company with whom they had been in cooperation. These people were then interviewed and also asked for other people from their company who had possibly affected the investment decision. The decision-making process in business-to-business relationships is typically complex and identifying the right people might not be as straightforward as it first may seem (Butz & Goodstein, 1996). There are often procurement agents, contracting officers, multiple layers of management and even boards of directors involved in the process. In these cases the interviewer had to rely on the judgment of others about who was involved in the buying process. In some cases it was noted that the final decision had to be approved by the management group or similar, but they were not otherwise considered a part of the investment decision.

All of the interviews were individual semi-structured interviews, except for one where two informants were interviewed at the same time. In order to create savings in time and resources, it could have been possible to collect data using focus groups as well. However, while the group members

can stimulate each other, their presence can also be perceived as inhibiting (Gummesson, 1993). A person may be willing to reveal something on a one-on-one basis but not in front of the whole group. In order to acquire more in-depth data, individual interviews were considered a better option. A total of 38 interviews were conducted for the study. The interview details are demonstrated in Table 11.

In Case A the interviews were conducted mainly by the author, but accompanied by a research assistant in four interviews (Companies A and A1), a researcher in one of the interviews (Company A) and a senior research fellow in one of the interviews (Company A2). Interview guides were used to outline the discussion topics. This guide was altered regarding the interviewees' work tasks and knowledge of the topics. For the supplier company these topics included the R&D process of the product, the S&M process of the product, user experience of the product and the intended benefits and value of the product. At the customer companies the interviews focused on the production, investment decision process, user experience and perceived benefits of the product. In total, nine people from the supplier company were interviewed and two persons from each customer companies.

In Case B the interviews in the supplier company B were conducted by a team of five researchers who were from different institutions but all a part of the UXUS program. This arrangement was made in order to cover several topics in one set of interviews. The author participated in four of the interviews. Because of this, it was not possible to affect the course of all interviews actively and the topics covered could vary in different interviews. An interview guide was also used in this part of the study in a more general level, covering topics such as general user experience, the communication of user experience in product launches, the involvement of customers in development processes, the sales process of the product and the benefits of the product for customers. The customer interviews were conducted by the author, and the interview guide concentrated on the investment decision, buying process and perceived benefits. In total, ten people from the supplier company were interviewed and one from each customer company.

The interviews in Case C were conducted mainly by the author, and only one interview was accompanied by a senior research fellow. The interview guide and discussion topics for the supplier company were mostly the same as in Case A. The interviews for the customer companies were conducted from the previous guidelines and edited to suit the context. In total, nine people were interviewed from the supplier company and two from each customer company. All interviews were recorded and transcribed by a professional sub-contractor into a written format.

	CASE A		CASE B		CASE C	
Supplier interviews	Company A		Company B		Company C	
No. of interviews	10		10		9	
Interviewees	- R&D Manager, Innovation Process - Team Manager, Software Development - R&D Manager, Control Systems - Product Manager, Multi-Level Systems - Team Manager, Technical Sales - Sales Director - Director, Marketing and Business Development - Managing Director (2 interviews) - Sales Manager, Automation		- Industrial Design Manager - Manager, concepts - Business Development Manager, Logistics - Vice President, Sales - Executive Vice President, Offering Development - Marketing Manager - Vice president, Business development - Sales and Marketing Director - Sales Manager - Product Manager		- Instructor - Chief Design Engineer - Project Manager - Product Manager - Research Manager - Sales Engineer - Sales Manager - Marketing Manager - President	
Avg. interview durations	69 min		65 min		59 min	
Customer interviews	Company A1	Company A2	Company B1	Company B2	Company C1	Company C2
No. of interviews	2	1	1	1	2	2
Interviewees	- Manager of Software Contracting and Technical Development - Production Manager	- Semi manufacturing manager - Programmer	- Stock Manager	- Logistics Manager	- Maintenance Manager - Manager of Electrics and Automation	- Chief Engineer - Technical Inspector
Avg. interview durations	41 min	101 min	56 min	101 min	44 min	46 min

Table 11 *Descriptions of the interviews.*

There are many different methods for analyzing and interpreting qualitative data. It should be noted that the analysis is an ongoing process involving continual reflection about the data, asking analytic questions and writing memos throughout the study (Creswell, 2003, p. 190). ATLAS.ti program, which was designed for analyzing qualitative data, was used to analyze the interview transcripts. For the coding of the transcripts, the first case (CASE A, 10 interviews) was read and suitable topics were identified. Descriptive coding (Saldana, 2013, p. 88) was employed in this phase by summarizing the basic topic of a passage into a word or short phrase. These topics were marked with comments in the transcripts, which were in Word format. After all ten interviews were read and marked with comments, these topics were copied into an Excel spreadsheet. In total, 441 topics were identified. After removing duplicates, a total of 122 topics remained.

These topics were then printed on paper and an affinity wall was built in order to sort the topics into relational groups. After reviewing the topics and the groups, some similar topics were merged and a few irrelevant topics were removed, resulting in 62 topics which were divided into seven categories. After reading through the supplier interviews from Cases B and C, 21 additional topics were identified, resulting in a total of 83 topics. The topics were then divided into 25 groups and 6 categories. The linkages between the groups and categories are illustrated in Figure 9.

After creating the list of codes to be used in the analysis stage, the interview transcripts were coded with the help of ATLAS.ti program. As a result, the most relevant codes and their recurrence in each case are presented in Table 12. The whole process could have been done with the help of the program, including the initial coding, illustration of the relational groups and merging similar groups and topics. However, it was considered a suitable exercise for this purpose to use a visual way of grouping the codes. Forming an initial list of codes made it easier to go through all 366 pages of interview data and recognize the most important topics for addressing the research questions.

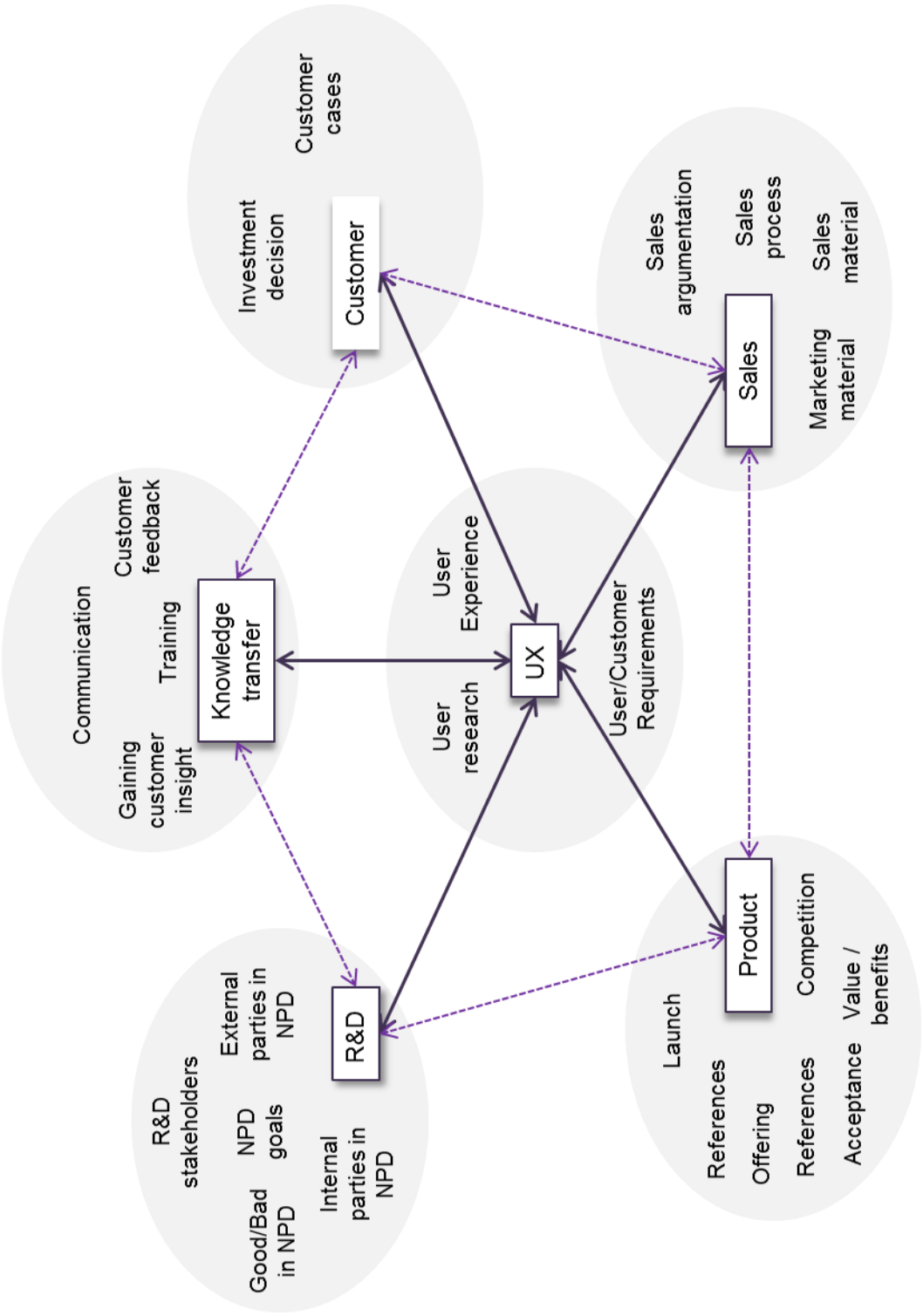


Figure 9 *Identified groups and categories from the interview data.*

Categories	Number of codes	The most relevant codes and their recurrence		
		Case A	Case B	Case C
Background	4	Work description (14) Role in product development (11)	Work description (12) Role in product development (8)	Work description (13) Role in product development (7)
Product	15	Benefits for the customers (28) Novelty value of the product (20) External reaction to product launch (16) Benefits for the users (16)	Problems with the product (22) Benefits for the customers (13) External reaction to product launch (12)	Benefits for the customers (12) References (11) Competitive factors (11)
Research & Development	15	Participants in R&D (27) Starting point for R&D (17) Participation of customers in R&D (16)	Participation of customers in R&D (16) The interface of sales and R&D (10) Participation of users in R&D (9)	Participants in R&D (7) Participation of users in R&D (6)
User Experience	13	The requirements of user groups (33) User groups (14)	User experience (21) The requirements of users (13) Usability tests (12)	User experience (36) UX in the company's strategy (18) The requirements of users (10)
Knowledge transfer	17	Intra-organizational communication (14) Collection of information from customers (10) Feedback channels (10)	Inter-organizational communication (10) Communication of user experience (10)	Collection of information from customers (16) External training (14) Communication of user experience (10)
Sales & Marketing	12	Sales (19) Sales argumentation (18) Marketing material (11)	Sales (16) Sales argumentation (16) Demos in sales (12) Sales of dealers (12)	Sales (17) Sales material (13)
Customer	7	Investment decision criteria (13) CASE A1 (12)	Users' role in investment decisions (18)	Users' role in investment decisions (8)

Table 12 *The categories and most relevant codes recurred in the analysis.*

3.3.2 Quantitative data

According to Woodruff and Gardial (1996), one of the key issues that managers want to know is their customers' perceptions of the relative importance of the different value dimensions. In this research the purpose of the quantitative study was to examine the importance of UX-related attributes in order to understand which attributes are the most valuable for the users and thus should be focused on in new product development. This was studied from the viewpoints of both the users and the people who have been actively involved in the development process.

In order to find suitable attributes for evaluation, the work of Bargas-Avila and Hornbaek (2011) was utilized in this study. Their paper *"Old Wine in New Bottles or Novel Challenges? A Critical Analysis of Empirical Studies of User Experience"* reviews how empirical research on UX is conducted. Their study reviews a systematically selected sample of 51 articles related to UX measurement that were published between 2005 and 2009. The study was selected as a basis for this study since it had already identified which methods previously investigated the topic of user experience. For this study the same set of articles was reviewed and content-analyzed to identify the most commonly used items in empirical UX studies.

The review process was conducted by the author and a research assistant who was working for the UXUS project at the time. In order to make the reviewing process more efficient, the 51 publications were first divided in half by the researchers (25/26 articles). From this sample, articles that did not report the measurement tools and items were excluded since they did not contribute to the understanding of how UX is measured. In addition, articles that reported only items that were a result of the study without defining the measurement method were also excluded. As a result, nineteen (19) articles were included in the further examination from the original set of 51. From Appendix 1, the following articles were used: 6, 7, 9, 10, 11, 12, 13, 15, 18, 19, 21, 25, 27, 28, 42, 44, 46, 47 and 50.

From the 19 chosen articles the following data was collected in an Excel workbook: the used measurement tool, the original reference of the measuring tool, the used scale and the item/word/word pair. In the beginning there were 371 items identified from these studies. These items were in different forms such as quality attributes or an item (e.g. 'pleasure'), a statement (e.g. 'I would recommend the product to my friends') or a pair of describing words (e.g. 'Difficult-Easy'). In articles where there were only some of the items used from a distinguished measurement tool (e.g. AttrakDiff2), only these items were included in the selection.

After this stage both researchers went separately through the list of items and coded the items in the form of adjectives (e.g. challenge –>challenging) in order to group the remaining items. This was done to find the items that could be later used as attributes in the importance rating questionnaire. At this point some of the measurement tools were found to be unfit for further coding:

- The SUMI statements used in the work of Mahlke and Thuring (2007) were not coded since it was found too difficult to express them with only one word without interpreting too much and losing the meaning of the initial statement.
- The Emocards used in the work of Isomursu et al. (2007) were not found useful for coding and thus excluded from the study.
- The article by Hartmann et al. (2008) included two own measurement items in a statement form which could not be accurately coded and were therefore excluded them from the study.
- The article by Lankes et al. (2008) stated only the categories of the measurement tool, such as “Perceived game speed”, which were not able to be coded into meaningful items. Therefore article 21 was excluded from the study.

As a result, eighteen (18) articles remained in the examination. The measurement tools used in these studies are presented in Table 13.

Table 13 *Different measurement tools used in UX studies.*

Measurement tool's name	Reference
AttrakDiff	Hassenzahl et al. (2003).
AttrakDiff2	Hassenzahl (2004).
Attrak Work	Väätäjä et al. (2009)
Heuristic evaluation	Sutcliffe (2001).
Pleasure-Arousal-Dominance (PAD)	Mehrabian (1996).
Pleasures of play	Costello & Edmonds (2007).
Self-Assessment Manikin (SAM)	Bradley & Lang (1994).
Subjective Mental Effort Question (SMEQ)	Zijlstra (1993).
The Software Usability Measurement Inventory (SUMI)	Kirakowski, J. (1996)
Visual Aesthetics	Lavie, T. & Tractinsky, N. (2004).
Authors' Own (8)	Hartmann et al. (2008a); Hartmann et al. (2008b); Jumisko-Pyykkö et al. (2008); Mandryk (2006); Liu et al. (2009)

After these reductions the coding of the remaining items was then unified by the researchers. The items with word pairs were divided into individual items (e.g. Amateurish-Professional) and duplicates were removed. This reduced the amount of separate items to 210 (total 519). When the final set of items was chosen, the content was analyzed with a data-driven method (Tuomi & Sarajärvi, 2002, pp. 106-116) by using the affinity wall approach (Holtzblatt et al. 2005, pp. 159-179). The affinity wall was chosen as a content analyzing tool since it provides a helpful way of grouping data by using visual association.

The analysis was data-driven with no predefined theory or categories, but all the data was organized in categories based on their apparent meaning. When starting to build the affinity diagram, the different words and phrases listed in the Excel workbook were printed out on paper and then

cut into separate, individual items. Next, these items were one-by-one attached onto a whiteboard and arranged into groups based on their similarity. An illustration of the affinity wall process is provided in Figure 10.

Figure 10 *Affinity wall on UX-related attributes.*

As a result, 32 different groups were identified after evaluating which groups were suitable for the questionnaire based on the research context, the relevance of the attributes in this context and previous results from the qualitative interviews. From these groups (15), the most often-occurring items were selected for the questionnaire. Since the selected items had to have a positive tone in order to measure its importance to a person, the word-pairs were coded back to one word at this stage. For example, in the group ‘Desirability’ there were four occurrences of the word ‘attractive” and also four occurrences of the word ‘unattractive’. Based on this, the item ‘attractive’ was found eight times. The formed groups with the total number of items and most often-occurring items in each group are shown in Table 14.

The selected items for the questionnaire are bolded. In addition to these fifteen items, two more items were added that had not appeared in the analysis. These were ‘Ergonomic to use’ and ‘Safe to use’. These items were selected for the survey since they had come up in various conversations with the interviewees. Because of this, they were found to be a suitable addition to the final survey. In the survey the respondents were asked to rate the importance of these seventeen UX-related factors on a seven-point scale from 1 (Not at all important) to 7 (Extremely important). The product users were asked to evaluate the importance of these factors considering a specific product from the supplier company. For example, *“When evaluating the [product] it is important for me that it is controllable”.* In all cases, this survey was completed after they had used the technology for at least a few months.

Table 14 *Formed groups and most often occurred items based on the affinity wall.*

Group (number of items)		Most often occurred item (number of occurrences)	
Aesthetic design	(24)	**Visually aesthetic**	**(10)**
Approachability	(23)	**Pleasant**	**(8)**
Arousing	(51)	Exciting	(10)
Captivating	(19)	Fascinating	(4)
Challenge	(9)	Challenging	(7)
Clarity	(23)	**Clear**	**(16)**
Classy design	(12)	Classy	6
Common	(27)	Ordinary	14
Confidence in use	(3)	Felt confidence in use	2
Controllability	(26)	**Controllable**	**(22)**
Desirability	(13)	**Attractive**	**(8)**
Ease of use	(26)	**Easy to use**	**(11)**
Effectiveness	(5)	**Supports goal achieving**	**(3)**
Efficiency	(12)	**Efficient**	**(3)**
Empowering	(7)	Supporting	3
Fun	(13)	Fun	11
Inclusiveness	(28)	Inclusive	8
Informativeness	(8)	Reliability of information	3
Intuitiveness	(32)	**Simple**	**(14)**
Learnability	(4)	**Easy to learn**	**(4)**
Logicality	(14)	**Predictable**	**(11)**
Originality	(36)	**Creative**	**(10)**
Pleasant design	(11)	Pleasant design	5
Professional	(10)	**Professional**	**(10)**
Recommendability	(2)	Recommendable	2
Reliability	(12)	**Reliable**	**(6)**
Skill development	(6)	Supports skill development	2
Social acceptance	(10)	Convincing	5
Support for creativity	(5)	Supports creating	2
Use of special effects	(7)	Use of special effects	3
Usefulness	(16)	**Practical**	**(12)**
Value	(25)	Good	9

The people working in R&D at the suppliers' premises were asked to evaluate these items based on how important it is to concentrate on improving these aspects in product development. For example, *"I find it important that the [product] is easy to learn".* R&D filled out the survey after the products were designed, launched, and used at customer companies. The aim was to understand what aspects they perceive important in further developing the products. For one case company the survey was translated into Dutch by a professional at a translation agency. The translation was then revised by a native Dutch speaker, who is a professor in the field of user experience. This was done in order to verify that the terminology used in the translation was still sound in the UX context.

At the customer companies the survey was conducted in a paper format. In four companies the survey was given to the supervisor of the users/operators and their task was to collect the answers from the users and send them back in envelopes for which the postal charges were already paid. In two companies the author was able to collect the completed surveys on site. From every customer company all the employees who used the products participated, resulting in a response rate of 100 per cent.

For the supplier companies the survey was conducted digitally via Webropol online survey and analysis software. In these cases the informants who were also responsible for selecting the interviewees selected all the people profoundly involved in the development process for the study sample. Personal links to the survey were sent to these selected respondents in September, followed by a reminder after one week and another after one month from the initial request. Since there was a small amount of available respondents, it was important to get as many responses as possible. After these reminders there were six people from the supplier side who had not yet completed the survey. They were then contacted personally and, if necessary, the survey was sent to them one last time. As a result, only two people did not participate in the survey. The number of respondents and response rates from each company are demonstrated in Table 15.

Table 15 *Number of respondents and response rates of the quantitative study.*

Case	Company	No of respondents	Response rate
Case A	Supplier A	9/10	90 %
	Customer A1	4/4	100 %
	Customer A2	5/5	100 %
Case B	Supplier B	8/8	100 %
	Customer B1	4/4	100 %
	Customer B2	5/5	100 %
Case C	Supplier C	16/17	94 %
	Customer C1	6/6	100 %
	Customer C2	4/4	100 %

Since only those people involved in the development process or the product use were questioned, the sample sizes remained quite small. Therefore if there is even one answer out of four which varies significantly from the others, it can have a great effect on the outcome. Because of this, an extensive statistical examination of the data would not have provided reliable results. In order to compare the results between people involved in R&D and the actual users of the specific products, two different tests were used which are appropriate for analyzing small samples: the Kruskall-Wallis test and the Mann-Whitney U test.

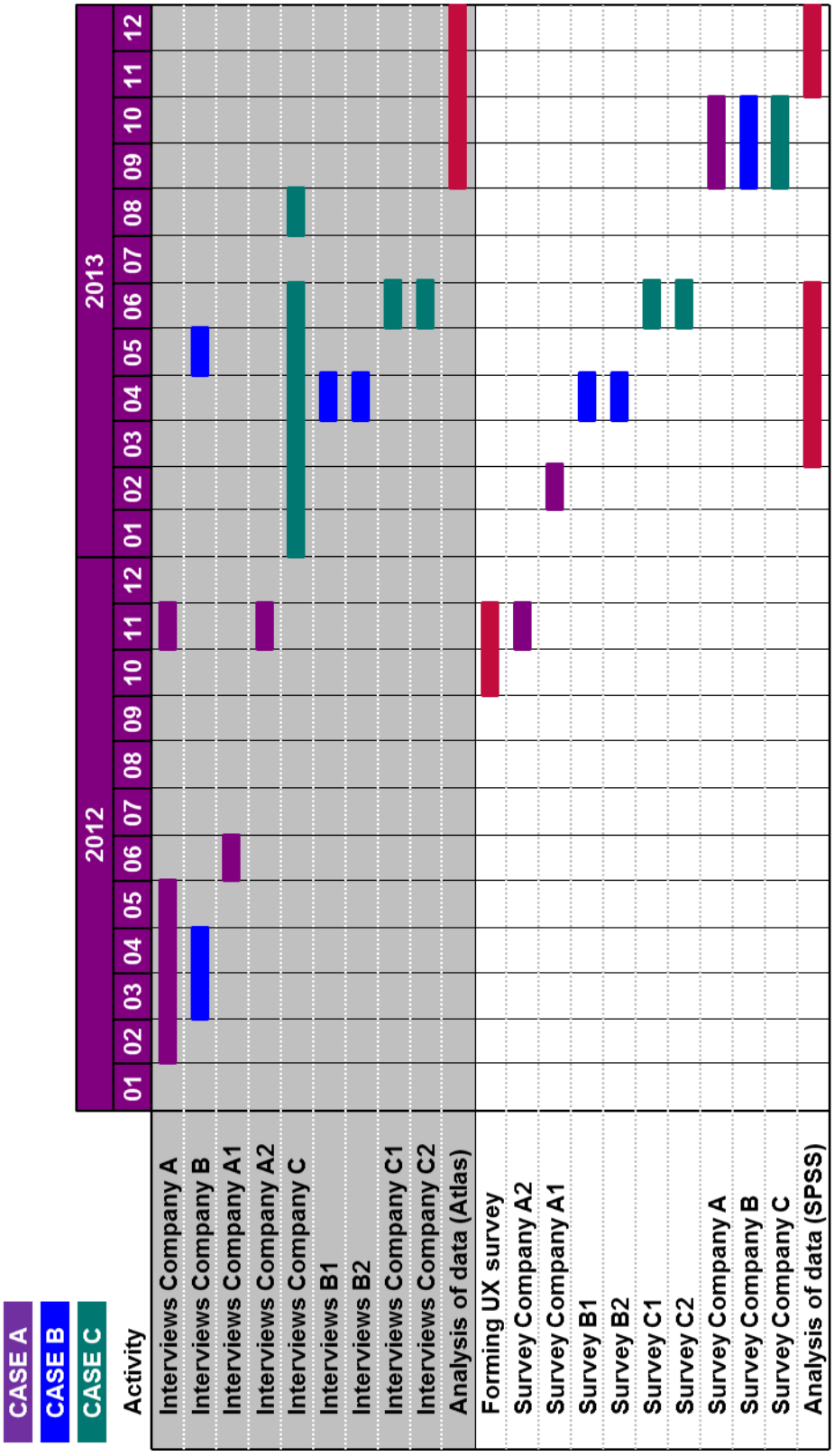
The “Kruskall-Wallis one-way analysis of variance by ranks” is a method of comparing different samples to calculate whether there is a statistically significant difference between the ratings of those attributes. The method relies on the scored-value ranks and the means of those ranks rather than examining the means of the data. The Kruskall-Wallis test was chosen to compare the medians of different UX attributes between the supplier and both customer companies. This test is considered suitable in situations where independent samples are compared, there are more than two groups in the comparison and where the samples of each group differs (Metsämuuronen, 2009, p. 1116). The Mann-Whitney U test was used in order to compare the medians of two companies. In this case, the focus was on analyzing the results between the supplier and each customer company separately.

In the data there were a few missing values (three in case A, six in case C) that were replaced with a reference value. This was done by calculating a variable as a sum for the values of each respondent within the data of each company (Metsämuuronen, 2009, pp. 534-537). These were then compared in order to find a variable closest to the one with the missing value.

3.4 Research process

The timeline for the collection and analysis is presented in Table 16. Most of the interviews in supplier companies were conducted in the beginning of 2012 and 2013. The interviews in the customer companies followed the interviews in the supplier companies as it was easier to gain insight of the purchase process from the suppliers first. The survey was constructed in the end of 2012 and then conducted first in customer companies and then in the supplier companies. After all of the data was gathered, the analysis with ATLAS and SPSS was completed at the end of 2013.

Table 16 *The timeline for the collection and analysis of data.*



4 EMPIRICAL RESULTS

In this chapter the empirical results of the studied cases are presented. Each section demonstrates the results of one case ensemble from the perspective of the research questions (see Table 17). First, UX is discussed from the suppliers' point of view. The focus is to understand, how UX is taken into consideration in NPD and sales processes. Second, UX is studied in the customers' technology investment decisions. The aim is to gain knowledge about the criteria for choosing a new technology, how users are involved in decision-making and what kind of role experience with previous technologies has when choosing a supplier. These first two questions are answered mainly with the help of qualitative interview data. In the third and last part of each section, perceptions on the importance of UX-related attributes are compared between the suppliers' R&D teams and the technology users from the customer companies. The goal is to find out whether the opinions of these parties differ through the help of a quantitative survey.

Table 17 *The distribution of research objectives within case chapters.*

Unit of analysis	Research objectives / sub-objectives	CASE A	CASE B	CASE C
Supplier: R&D	The perception and role of UX in product development processes	4.1.1	4.2.1	4.3.1
Supplier: S&M	The perception and role of UX in sales and marketing activities	4.1.2	4.2.2	4.3.2
Customers: people involved in the technology investment decision	Criteria for technology investment decisions and the role of UX in them	4.1.3	4.2.3	4.3.3
Supplier: R&D Customer: users of the products	The importance of UX-related factors in product development and the use of products	4.1.4	4.2.4	4.3.4

4.1 CASE A

In the first case description the focus is on supplier company A which designs automation systems for the manufacturing industry. Their customer, company A1, bought their first system from company A and at the time of the interviews the system was being built for a new production line. Customer company A2 has had a long-term relationship with company A and bought a new system for their new production plant. Both companies A1 and A2 were two of the first deliveries for a new system that was just developed by the supplier. In both cases the delivery and introduction of the new technology were behind schedule, which seemed to impact the overall experience considering the technology and the suppliers' performance.

4.1.1 Designing UX without the users – a hit or miss?

In Case A, the company had designed a new control system, which had already been launched in spring 2011 internally and later that year in a trade show for potential customers. One of the main reasons for developing a new system was that the previously-used technology was starting to age and the technical support for the software development tools would expire. Since the styles and standards in designing user interfaces had also advanced, the interface of the previous control system started to look outdated. There was a strong intention from the supplier's side to develop an interface for the system that would be more appealing to customers.

As a result of several customer deliveries, the company had gained a lot of knowledge about the kind of requirements customers and users have considering the systems' functions and visual design. With this new control system, the company wanted to keep the elements that had received positive feedback but also renew the system so that it would better fit the needs of their customers. The development project was seen as 50 per cent technology push and 50 per cent market pull; although there were some technological reasons for R&D, there was an effort to renew the system in a way that would satisfy both current and potential customers.

> *"Of course, when you think about the control system, we have to renew it in a suitable manner, we can't use the old one forever. This is kind of like with cars and other things that have different models. I don't think that in those cases either you can say that some customer has given the requirements of how it should be. You have had to guess or predict that this is what they want." (A:I1:R&D)*

In developing the control system there could be noted a great effort in trying to create a better UX and make the system easier to use. The terms 'usability', 'user interface' and 'user experience' were a big lead in developing the system. When the interviewees were asked what is special about this solution compared to previous ones, three things were mentioned: 1) predictability of the production, 2) usage of the system via web browser, and 3) use of touch screens in the loading station

interface. The customers' had given critique of the former control system in that they could not see what work should be done during the day, what tools are needed, when people should be loading and unloading the work or when the machines will be running. With the help of the new control system customers will be able to better plan the resources needed in production. They are also more able to react to deficiencies or distractions in order to secure the time of delivery. In addition to these features, a lot of effort was put into the visual design of the user interfaces.

The development process started with the goal that people should be able to explain the system outline in fifteen minutes. For this purpose a "fifteen-minute story" was developed, which was used as a thread for the development process. The story was utilized in defining the development targets of the system, which in a sense helped in the implementation of the whole process. It also helped make the system understandable for other parties inside the company and for customers as well.

The whole development process was mostly R&D-driven, but a selected team of professionals participated in decision-making. From the very beginning the project had a management group which consisted of the leader of the business unit, Project Manager, Sales Manager, After-sales Manager, Technical Sales Support Manager, R&D Manager and the Product Manager. The management group was responsible for the budget, schedule and planning of market launches, among other things.

Considering the systems' features, R&D had their own team that was responsible for system specifications, programming and drafting the marketing material. According to the interviews, other parties such as sales, marketing and service were heard before and throughout the process, but they did not really participate in the actual R&D process. The reason for this was that the R&D team felt that they had an adequate understanding of what customers and users require in their work and bringing other parties into the process would only complicate it.

Although other parties inside the company were not involved in designing the new control system, the R&D team made a better effort to inform others about the process than in previous cases. They had learned that people inside the company might not accept the product if it is already finished by the time they hear about it for the first time. With this new control system, wireframe models and highlights about the system were shown to the company's employees before anything was done in practice. In addition, information about the progress of R&D work and the reasons for making choices were given at least a few times a year. Therefore the initial internal response for the new system was very positive.

The marketing material for the control system was also produced by the R&D team. The team stated that they could not get the kind of support or contributions they needed from the marketing team. On the other hand, the people from marketing felt that they had to give up control of the content and only concentrate on the graphic and visual design of the marketing material. This indicates that

there is some difficulty in co-operation between the R&D and marketing functions. When asked how much information marketing personnel received from R&D in order to complete their job, they felt they received enough information as long as they actively engaged in back-and-forth communication. When there is a clear need, such as when planning new product launches, Product Managers are the ones that contact marketing.

During the development process, neither customers nor users were consulted about the features or design of the system. The system was developed relying on the information gathered by the R&D team throughout several previous customer deliveries. The interviewees from R&D referred to so-called “silent information” which they have received during years of customer contact with customers. However, there was a lot of discussion on whether customers and users should have been more involved in the development process. This way, the people in charge of design decisions would have a better certainty about whether they are making the right choices.

The problem was that R&D found it difficult to get input from customers that could truly contribute to the design process. The problem seemed to be that if one listens too much to one customer, then only those specific needs are taken into consideration even if they are not the same for the majority of customers. So there is a chance that by pleasing others the company is disregarding the needs of multiple customers, which might be harmful for the business. There is also a chance that customers are not able to explicitly address their needs or do not exactly know what they need.

> *“But many times it is very hard to get anything concrete from customers. Everything should be great and cheap but…it’s really hard to get something concrete. Or then you might have a customer that is very technically-oriented and then you get something difficult. And not all in our clientele are technically-oriented.” (A:I6:S&M)*

One of the reasons for not wanting to include customers in the development process was the fear that it would affect the sales of the former control system. If customers hear about the new system, they might not want to buy the previous model anymore. And before the new system would be launched no systems would be sold during that time. This was considered too risky during the development process.

There was also discussion about whether there should have been some research on actual users of previous control systems before the development process even began, or at least usability tests on prototypes during the development process. In this specific project there was no real effort to include users or seek their opinions in the development of the new control system. There were many reasons for this, including that in order for the user research to be reliable it should be conducted in all important market areas, not just one. Arranging this kind of research was perceived too expensive compared to the quality of information received from it. Although there was research on user profiles in previous development projects, the interviewees felt that they did not get anything new from this kind of research apart from what they already knew from their own experience.

When it comes to usability testing, it was also perceived as challenging and expensive to arrange according to the interviewees. The intent was to test the usability of the control system with different parties, but due to lack of time and money this stage was passed. According to the interviewees, one problem with testing a user interface was that it needs the whole system behind it in order to understand the full functionality. It was argued that one should have the full system with the machinery so that the UX with the touch-screen loading station would be realistic. Using paper prototypes might give an idea of the flow but it may not be enough for understanding the functionality of the system.

Despite these reasons for not conducting more research, many interviewees still wondered whether they had enough knowledge to make the right choices in the design so that it would fit the actual needs of customers and users. Since these interviews were conducted before the system implementation at customer sites, they could only hope that right decisions were made.

> *"Of course when we talk about how this looks from the customer's point of view, we have some difficulties and it is not easy to get the end-users opinion on what really are the experiences and problems with older versions at their factories. We conducted some earlier research, but is it enough and have we considered the different needs of different users enough?" (A:I5:S&M)*

For the first time, different user interfaces were designed for three user groups. The purpose was to ease the users' workload since they have a view that displays only what is relevant for their tasks. For example, the operators who work at the loading station do not have to worry about making decisions about what they should do next since their work is already planned for them and the system tells them what tasks they should complete and in what order. The perception that this was a requirement for customers came from Central European companies where, according to the interviewees, operators have less responsibilities and authority to make decisions. The feedback for R&D from the customers was that the former control system provided too many possibilities and too much authority to the operators. The main idea was to simplify the work and, also from the managers' point of view make it easier to train new employees. However, since these interfaces were also designed with the help of "silent knowledge", there was some speculation on how well these intended user groups correspond to reality.

At the moment, customer feedback comes from different channels. Salespeople receive feedback about what kind of features customers would want the system to have. And if customers have previous models of the control system, salespeople can get feedback on how to develop them as well. In addition, several interviewees said that whenever they are visiting customer premises they try to talk to as many people as they can and get feedback from them. However, there seems to be some communication difficulties between different parties inside the company. For example, some interviewees from R&D did not know how to receive and utilize the knowledge that salespeople gained from their customers. According to R&D, one issue was that salespeople tend to focus only

on the ongoing sales activities. This means that they are concentrating only on the needs of one single customer.

> *"[…] it is really important that we get the needs from our customers, but it tends to be so that a single salesperson is very shortsighted. All needs comes from those hot cases; "yeah, I need that for this right here". And so they look at their clients from one market area, but another salesperson looks at it from another market area, and they have very different requirements. And then we should still be able to serve all. So, it's kind of challenging in choosing who to listen to." (A:I2:R&D)*

One suggestion from R&D was that salespeople should have their own formal processes for dealing with customer feedback so that there would be a clear message about what the customers want. This way R&D could reflect their knowledge about customer needs with real feedback. On the other hand, the message that R&D has planned for the customers should go through salespeople so that customers would know what kind of value was originally intended by the design. This way R&D could improve existing products with the help of customer feedback, and salespeople could communicate these improvements to their customers.

When asked whether the feedback should be acquired straight from customers by R&D, it was seen somewhat as a resource allocation problem. Although in some cases, people from R&D often participate in customer meetings. It was seen important from R&D's point of view that technical sales personnel and sales managers act as the voice of the customer since they are the ones that work as an intermediate between R&D, production and sales.

Feedback is also received from mechanics, service engineers, people who are responsible for training users and people working in telephone service. The company also has an official application for reporting customer feedback, but not all departments use it and it is not considered agile enough for handling and processing feedback. It was especially noted that the technical sales input could be greater. R&D also has their own system that is used for recording errors in the system and suggestions for system development. In previous years, R&D events were arranged where customers were invited to attend. These events worked as a forum for introducing new technologies that the company has been developing. It has also given them an opportunity to get instant ideas and feedback from customers during the development process.

Since customer feedback is now coming from several channels, and there is no official way of handling all the received data, there is a clear desire to formalize these processes. There should be instructions on how data is gathered and stored so that it would enable a systematic analysis of the data. This way, it would be easier to discover the most important things for further development.

As a summary, the system development was conducted with clear targets considering its features and UX. However, the development process was mainly carried out by the R&D department while other parties such as sales, marketing, customers and users had only minor roles in the process. Although R&D felt that they gained a good understanding of what their users need from previous customer cases, they were still unsure whether they made the right decisions concerning the system. Since there were no user or usability studies conducted there was uncertainty about whether the system would actually fit the customers' and users' needs. Gaining feedback from customers and users should be a more formalized process in order to gain the best advantage from the information.

4.1.2 Difficulties in converting UX into useful sales arguments

When it comes to selling the system and communicating its value to potential customers, there are two different routes for making the sales. First, the company sells systems straight to customers. This might include only the control system or all the equipment that is required for production, machinery included. Second, the system is sold to customers through partners which are original equipment manufacturers (OEM). When the sale is done through the second route, the system is introduced to the OEM who is then responsible for selling the entire ensemble to the customer. In the latter case, the intended sales arguments might not be used and the customer might not fully be aware of all the system features.

In the case of selling to end customers, companies can vary from a fifteen-person company to one that employs five thousand people. In a smaller firm, the control system might not have a big role and it is more important for the customer to get the right kind of layout for material flow. When discussing a new system for the customer, they usually have a production demand where they are renewing the machinery or they need more capacity and are considering acquiring automation to resolve these issues. There are often technical salespeople involved in the sales process who are responsible for the technical details of the sale and showing system demos.

The R&D team compiled a list of sales arguments or highlights that they would want the salespeople to introduce to the customers. These included ease-of-use, predictability, informativity (getting the information about what happens next) and place independency (the system can be used from your own computer via web browser). The system was also described as being modern and visually appealing with clear graphic reporting about, for example, how much it costs to produce an item. However, the list of sales arguments was critiqued as in many cases the conversation with the customer advances quickly from the highlights to how the system actually works and what kind of technology lies behind it. This is why the marketing material was not found as useful as it could be since it concentrates only on the top-five benefits for the customer.

“Maybe it’s just hard to describe a benefit with one sentence. I think one of the points were that there is a web-based interface. Well, so? How do you measure it? So what? Then we can explain how great it is that you can walk to any computer in the factory and open it with your own user-id and see where the production is going and do necessary adjustments to the production plan when you’re on the phone with the customer. But it always requires these added sentences on why it is so and what’s the benefit from it.” (A:I5:S&M)

It was argued that these kinds of highlights are good for marketing and getting potential customers interested, but they’re not what will bring a sale. When the salespeople were asked about their selling strategy or technique, they explained that they do not actually have to sell the system to customers by using predefined sales arguments. The focus is more on finding a solution to the customer’s problem and making a good offer. And if the offer is good enough, the customer buys it. However, it should be noted that both interviewed salespeople have had the chance to develop their selling techniques through years of experience. In these cases, the totality of the production is the main concern; what is the production layout, what is the flow of different materials, what machines are needed. How the system works in these surroundings comes second. The negotiations might start with discussion about the visual aspects of the system, but soon enough the focus shifts to how the system functions and how much it costs. It was also argued that an inexperienced salesperson might focus on how the system looks while a more advanced salesperson explains how the system works.

”In a way, I sell without arguments. I’ve never had that kind of sales method that I’d have a huge amount of arguments in my bag and then I pick the best ones for this particular customer. Then I just let them out. Quite the opposite; I always start by listening to what they have to say and then try to understand what to offer them so that it would make any sense.” (A:I10:S&M)

When it comes to the sales process, customers are usually taken to another customers’ production plant to see how the system works in practice and to hear direct feedback from the users of the system. This was seen as the best way to bring UX into the sales process. Even though the same things are mentioned in the marketing material, it was not seen as an efficient or believable way of bringing the user’s voice to other customers.

“But the best way to bring it [UX] forward is to go to a reference site and let customers talk to each other about how things have gone, how the system works et cetera. That is the best way to have information transferred. If we say the same sentence that a customer says to another, then they won’t believe us. But they will believe them [other customers]." (A:I9:S&M)

However, at the point where the new system deliveries were just starting, there were no reference sites where customers could go and see the system in use. The company only had one system built in their own test laboratory. Therefore it was hard to communicate the UX to customers since it was such a new product that it had not been previously used.

When asked about whether UX was seen as a competitive advantage for the company, the interviewees agreed that it is an important element in competing with other suppliers. When the system is easy to use, and operators are happy to use it, it can lead to better productivity and better results for the whole customer company.

> *"When we now develop our integration, it is clear that one of the features in these systems is the user interface, where the human and machine come together. And it is clear that with developing this feature, it will affect how the machine is used. And the easier it gets to use, the more it will bring us competitive advantage. If we can say that our system is ridiculously easy, and all you have to do is show the users how it works, that is the thing that will bring value." (A:I7:S&M)*

In summary, there were two difficulties in including UX-related knowledge into the sales process. The first was that it is problematic to convert UX into effective sales arguments. At this point, many of the existing arguments still need a lot of explaining in order to clearly deliver the message. Another issue was demonstrating good UX when a system has not been used at a customer site before. Without the experience, it is hard to argue how good the system actually is from a user's perspective.

4.1.3 Technical features vs. UX in technology investment decisions

Investment decision criteria from the supplier's viewpoint

One of the interests of this study was the impact UX has on investment decisions and how much users affect these decisions. According to the salespeople, who gets to participate in technology investment decisions greatly depends on the company's size. For example, the owner, chief executive officers, people who are involved in production development, purchasers or users can be involved in decision-making. Negotiations usually start with a production development engineer or a production manager who is in charge of production and knows the most about the production process. One interviewee mentioned that there is often a very powerful person in the customer company that they like to call "the motor". These people are technically-oriented, well-educated about different production possibilities and are willing to take risks and renew the production with automation. This is the person that salespeople want to get in contact with because if they manage to convince him or her, then it is more likely they will make the sale.

There was also discussion about the buying criteria for this particular system and how the user needs are taken into account in decision-making. Although managers are mostly interested in the

system's payback time and other economic issues such as price, it seems that users' needs and experience are becoming a priority as well in the investment decision. It was mentioned that a system should be simple, easy to use, ergonomic and safe to use from the operators' point of view. A system that pleases the user is seen as an investment to the company's employees.

Some of the issues that R&D would want salespeople to emphasize for customers include the software features, ease-of-use, visual image, supplier's reliability, references and after-sales service. The company's reliability as a technology supplier was seen as one of the main reasons why customers would buy their services. Since purchasing a production system is such a strategically important investment, it is vital for customers that everything works as planned and the installation takes place at the given time so that there are no delays in production schedules. Having plenty of references gives the company a reputation of being a reliable partner.

Investment decision – customer company A1

The first customer case company (A1) built a new production plant in 2009 where some of the prevailing production had been moved. Their plan was to add a new production line with a control system to that plant. The main purpose of the new process control was to reduce the amount of work phases from fifteen to three. The planned degree of automation was high and although the processed items are turned by hand in regular shifts, the system needs to run also during nights and weekends non-stop on its own. The system was purchased due to the need to produce more items in a shorter time and to make the production more flexible. This way company A1 can provide a shorter delivery time to their customers. Using fewer resources in production enables cost efficiency which aids in competing with companies who differentiate themselves with lower prices. The system also works as storage so it takes less time to find items needed for production.

In production the customer company has a line manager, supervisors, programmers and machine operators. Although they did not have experience with a former system from this particular supplier company, they had used systems from other suppliers in production. At the time of the interview, company A1 had used fine scheduling in their production only for a year. One of their interests was being able to monitor the lead-time and total volume in production and to make changes in the production with the help of the system. The interviewees were, however, more interested in that the system works the way it was designed than being able to see detailed information via web browser. It was perceived more important that the system lives up to the customer company's expectations.

The companies' representatives knew each other personally from previous collaborations in production machine deals. The supplier company had already been a part of negotiations when A1 bought their first system in 2006. That time, another supplier won the bid due to a lower price and faster delivery time. Within this case, suppliers were again invited to tender. Since the requirements for part production were very specific, only a few suppliers were able to provide this after

running many tests around Europe. The negotiations started with planning what machines the customer company needs for their new production line and how the flow of material should be organized. In this manner the production equipment was the primary interest and the system was bought with one machine as a package. The main purpose of the system is that it can run unmanned periods in the production and it adds flexibility to the production.

The total solution was what determined the deal: the supplier was also a distributor for the machines the customer wanted and the system was compatible with these machines. Also, the supplier was well-known and the customer was aware of their capabilities. The system was also perceived as better than competitors considering the technical details. One criterion was that the maintenance service provided by the supplier was local, and the customer has quick access to help whenever needed. In addition to these, the supplier was seen as a reliable companion and their technical know-how was perceived as superior to competitors, which was very important for company A1.

The customer interviews confirmed that the technical features were not the main sales arguments that sealed the deal. The equipment assembly and system-machine compatibility mattered most. The software is something that all suppliers have but the technique behind it was what mattered in this case. The criteria for the investment decision were seen as three-fold: 1) technical issues, 2) business issues, and 3) service issues. First and foremost the technical aspects have to be in place; if the machines do not fit the technical requirements, then they are automatically withdrawn from the competition. The technical details do not matter if the system does not function as it is supposed to. Second, the business aspects include, for example, price, delivery time and warranties. And last but not least are the after-sales services; this includes how the maintenance is arranged, how reliable the supplier is, what kind of references they have and whether the company will still exist in ten years' time.

The first deal with customer A1 was done with the former system. In between the negotiations and the delivery time, the new system was launched. The customer company was given the choice to decide whether they wanted the old or the new system. The customer chose the newer system since they felt that it would have better technical backup and future software updates. They were aware that there might be some technical problems in the installation of a totally new system, but were confident that the supplier would react to these quickly. In this case, only the Manager of Software Contracting and Technical Development and the Production Manager were part of the investment decision for the system. It was found difficult to include operators' opinions in decision-making since they might form their opinion of the new system from one day of work and compare it to a system they have used for many years. If the new system is very different from what they are used to, they might not be able to see the advantages or positive aspects of the new system.

> *"The extreme difficulty here is that it would be great if we could take the system for a test drive, like a car, for a week and then run it and do the most extraordinary things with it. Unfortunately, this is not possible." (A1:I2)*

It was still important that the actual users could be a part of the discussion when it came to new equipment, but the difficulty is then how to ask the right questions if you are not aware of all the system's features. This means that the supplier has a great responsibility in introducing the system comprehensively to customers and users.

The interviewees were asked whether UX is important in technology investment decisions. The feedback indicated that they tried to consider this in decision-making, but the technical details had a much higher impact. It was also mentioned that these recent investments may come with many features that the company might not know how to utilize in production, but they still might come into use within a few years. So sometimes the decision might come down to which is easier to use and which has more features that will be beneficial in the future.

It was also discussed whether good UX could become a competitive advantage for a supplier company, especially when all other things are considered equal compared to competition. It was argued that it probably can be, but any system feels easy to use (even if it really is not) if it is the only system that one has experience of. People tend to pick what they are most familiar with. It was also noted that users with different levels of know-how experience systems differently; the experience of using a system is different for someone who has used it for years and someone who experiences it for the first time.

> *"Good usability is when you press one button and everything you are thinking of happens…that is the ideal situation. But in different systems it requires effort to produce your own thought into it; sometimes you have to press ten buttons and sometimes twenty, make a different program and so forth." (A1:I1)*

The benefits of the system for users were seen as a possibility to schedule their work more freely, meaning that they can prepare items for production or maintain tools when they feel is convenient and not having to have to work with the machines terms. It was also expected, from the supervisor's point of view, that productivity would grow when operators are able to allocate resources somewhere else, for example, helping others with their work phases.

Investment decision – Customer company A2

In the second customer case, the company A2 bought their first system from the supplier in 2000. In 2011 they built a new production plant where manufacturing equipment from the old plant had already been moved. There were two possibilities: move the old system to the new plant or buy a new system. Since acquiring a new system was only slightly more expensive and they intended to extend the system, the decision was made to get a totally new one.

The biggest challenge A2 had in production was bringing down their stock. Since they were constantly developing their production they had a large quantity of parts that were not used anymore and were thrown away. Another challenge was reducing the product's manufacturing time. There was a lot of idle time between different phases in production which made the lead-time longer than necessary. A2 also had plans for making their production more flexible and being able to downsize their batches from 200 to 10 or less. The whole system was extended, increasing the amount of pallets from 30 to 90 so that it was possible to immediately start production when an order comes. With the old system they had to wait until a machining was finished before they could start another task.

When looking for system suppliers the company noticed that there were not many alternatives. A2 wanted some specific features such as scheduling and integration to other systems, and company A was the only one that filled these requirements. Company A was technically more advanced than competitors, they had a considerable amount of good references and A2 had already done business with them and were satisfied with their service. The first deal was made on the former system, but since the new system had more bytes and a better integration opportunity, the customer chose the newer system. Most of the negotiations were made with the OEM who was delivering the machine equipment. Since this was the first version of the new system, the supplier did not have prior experience of delivering the system to a customer site.

The customer company's plan was to stop all production at the old plant when the system at the new plant was running as expected. This was planned for April of 2012, but it was delayed until August. By the time the customer moved all production to the new plant there were still technical difficulties with the new system. One of the challenges in this case was that the machine tool automation came from the OEM, and the system supplier had to deliver the software for it. This arrangement caused issues to develop between the customer, the OEM and the system supplier.

When closing the deal on the new system, the people involved in the investment decision were very enthusiastic because, according to them, the previous system had been really user-friendly. They felt that the new system was more current and relevant compared to the former model. They saw that there were a lot of advantages with the new system but because they had so many problems with the software within the first three to four months, their enthusiasm started wearing out. For example, there is a possibility to connect the system with the company's ERP (Enterprise Resource Planning) system, which would reduce the amount of paper work in production. However, this connection was not yet realized because of other problems in the software. Another good possibility was the use of the reporting tools, especially connecting with their MES, but they had not yet put any effort into this.

Company A2 faced two kinds of problems: 1) problems in using the system and 2) delivery problems with the supplier. First of all, there were many technical difficulties with the introduction of the new technology. The previous system was considered easy to learn and easy to use compared to

the new one. It was more intuitive and took less time to understand how it worked. In addition to this, even the people who were responsible for service, installation and training did not know how all of the features worked in the system.

There were also some features that were removed from the new system that were previously found helpful in production. Some new features, including the touch screen, did not work as planned in the beginning which affected the initial UX negatively. The customer felt that their needs were not really taken into consideration when developing the new control system. Although there were some features they found beneficial and even necessary in their own production, changes were made that were not only positive.

> *"I think they never, never, never asked customers, 'if we're gonna build up a new system, what do you want in there?' For example, we've got some set-ups that are pretty hard to understand or to tell somebody. I want to have, some…add some pictures or whatever to that file. In the old system I could do that. In the new system, I haven't seen the possibility yet. So they took some things out that I think are really handy." (A2:I1)*

The customer company also had delivery problems with the supplier. Since the delivery time was delayed, their own production and deliveries to their customers were also delayed. The reason why company A2 is successful with their own customers, according to their view, is that they listen to their customers and come up with new products that fit the customers' changing needs. They are flexible in installing and maintaining equipment and do 90 per cent of that work over weekends so the customers do not have any downtime. One of the biggest reasons why customers choose them instead of competitors is that, although the machines have the same price and specifications, their machines have a lower maintenance cost.

When asked whether UX had an effect on the investment decision, the interviewees agreed that since they had such a good experience with the former system, it definitely had an impact on why they chose company A as their supplier. It was also discussed whether the system users were involved in decision-making and how well the designed user interfaces suited their job descriptions. Since the former system functioned so well in the past, everyone who had used it felt confident in acquiring a new system from the same supplier. They were also certain that the use of the new control system would get easier as they got familiar with it. Then the perceived UX will also get better when the system is not constantly changing.

However, the operator's role in production differed from what the supplier's R&D team had assumed. Although the supplier thought that operators especially in Central European countries have less power and responsibilities in production, this was not the case. At least in this particular customer company, operators need to know everything about the system and be able to use all features necessary to complete their tasks. For example, if only one of the six operators know how to use the system properly, then they are too dependent on that one person if something goes wrong.

> *"If you, as an operator, can't do the complete system. Then every little thing that is going wrong, you need somebody else. Then I need two times as much people on the same machine. "Paul" has done a lot, on this system. And he set it up, but everything he does, he told all the other guys. If your other guys don't know, when something goes wrong and he's on holiday, (this Christmas), then.. [utters a laugh] you've got a big problem." (A2:I1)*

This segmentation of operators' roles was also challenged by the person who sold the system to company A2. They argued that operators' work and the amount of authority given to them is case-specific. And although in some cases the operator's work can be very restricted, in other contexts the operators might have tasks in their job descriptions that require more authority considering the use of the control system. Today, control system users are more and more involved in decision-making in Central European countries and the floor level know-how is very much valued.

Comparing the views of the supplier and customer companies

In summary it can be noted that in these particular relationships the technical features and compatibility of the system were of great importance when choosing the system. The supplier's know-how and competence and positive previous experiences in dealing with the supplier also affected the customer's decision. However, since there were delays in the delivery and the system was still unfinished when installed, it had a negative effect on the customers' overall relationship experience and the users' experience of the system as well.

The supplier interviews indicated that UX is becoming a priority for customers and users are able to influence the investment decision. From the customers' point of view it was evident that previous experiences with former products and the supplier had an impact on the selection. Thus, the value of UX cumulates over time as customers and users gain the experience from previous business relations. A summary of the results are illustrated in the following tables. In Table 18 there are inserts from the questionnaire for R&D where they were asked why a customer company would buy their system. There were in total nine respondents for this survey. The new features and the system's technology were seen as benefits for the customer. However, the actual UX did not emerge from these answers, with the exception of 'ease of use'. In Table 19 a summary is presented from the customer interviews (four interviewees) about their actual technology investment criteria.

Table 18 *Reasons for why customers would buy a system from company A from R&D's point of view.*

Category	Description/Quote
Best in market	It is the best and most versatile system in the market.
	It is the best system available – considering the features, user interfaces and flexibility, other systems can't get near.
New technology	Modern technology and features. The technology endures the machinery's lifetime and retrofitting is not ahead in just a few years. It is possible to alter and integrate even later.
	The newest version -> maintenance and development.
	Carried out with modern technology; platform will work for a long time
New features	New features.
	Software features.
	Even the options in the basic software have a lot of functionality; no necessary need to customize (which is expensive).
	Touch screen panels as user terminals.
	Predictive, dynamic and automatic scheduling of production, which enables a view on what the system will be doing in the near future (for example, the next shift), which reveals possible shortages in resources (tools, materials, NC-programs etc.) in time, so that it is possible to react to these deficiencies.
	Simulated production -> forecasting and resources required
	Access to all production data from your own computer via web browser
Ease of use	Easy to use.
	Ease of use.
Other	Visual image.
	Reliability of the supplier.

Table 19 *Summary of customer companies' technology investment criteria (Case A).*

Category	Description/Quote
Best in market	Regarding their technical competence it is superior in the Finnish market.
	Company A has a monopoly. There are no alternatives.
Good experiences with previous products	We had never had any big issues with software of Company A so, that's something they do good.
	I was real enthusiastic about the product of Company A because the old one was really user-friendly.
Local after-sales service	The arrangements of after-sales services.
Product compatibility	The system's compatibility with production equipment.
Product integration	The integration was a lot better, and I wanted something that I can integrate with my other systems.
Supplier reliability	It is essential how reliable we see their business.
	The reliability of the seller and the supplier.
Supplier stability	If the company is still in operation within 10 years.
Technical features	The system has to meet some specific technical requirements. And if it doesn't then the systems is automatically out of the competition.
	Useful features.
	Technical features.
	The software is pretty good.
Other	Price
	References
	Time of delivery
	Warranty

4.1.4 Reliability and safety of use as critical UX attributes

In order to understand the intended UX, the people involved in R&D were asked to describe what a good user experience is for the control system users. The most often-occurring response was that the system should be controllable; the user should feel that they are in control of the system in different situations, especially when something unexpected occurs. The system should also be easy to use; the system does what it is expected to do and makes the job easier for the user. The fact that the system should be informative was also considered important. The system should provide information regarding what the user should do next. This way the user always knows what they should do after completing a task. Aspects that received less attention but were also acknowledged were that the system should be clear, logical and reliable. The results from this question are presented in Table 20.

Table 20 *Drivers of a good UX from the viewpoint of R&D (9 respondents).*

UX driver	Citation
Clear	The user interface does not have too many functions shown on the same display.
	The routines used the most should be effortless and clear.
	After an adequate training the system should feel clear (one should in no circumstances use the system without training).
Controllable	The user feels in control of different situations.
	The feeling of control is important; the user feels that they control the system.
	The user should be able to "take control" of the system if needed, meaning that they could surpass the decisions made by the system.
	In addition to the automatics, the user should be able to control the system manually as well.
	Flexibility is more important than full predictability, which means that the system should advance production smartly even when unexpected events occur.
Easy to use	Even a new user should have the courage to use the system without being afraid of forgetting how to do things right and in the right order.
	When doing routine work, one should not have to change between displays/interfaces.
	One doesn't feel like using the system, only doing their main job (getting items produced).
	The system brings the pallets automatically in the right order to the user.
Informative	The system should provide enough information about problem situations (for example, shortages in production resources), and catch the user's attention efficiently (without the user having to check up on the system on one's own initiative).
	The user always knows what to do.
	The system tells you what to do next, which order is the most important, and so forth.
	The information needed for the next action is easily/immediately available.
Logical	The user interface is logical.
Reliable	The system should never "crash".

These drivers of UX were also emphasized in the results of the questionnaire where seventeen different attributes were rated based on their importance in R&D. Four of these attributes received a median of 7, the highest possible rating. These included reliability, ease-of-use, safety of use and controllability. The least important aspects were that the system is creative, simple, visually aesthetic or attractive.

This same questionnaire was conducted for the system users, as explained in Chapter 3.3.2. In order to analyze whether the results between R&D and users from the customer companies differ, the Kruskal-Wallis test was conducted to compare the medians of different attributes for all companies. The null hypothesis was that the distribution of different UX attributes is the same across cat-

egories (companies). In all but one case, this hold true. For the attribute ‘creative’ the significance level was 0.037 which indicated that the null hypothesis should be discarded.

When comparing the answers between company A and company A1 with the Mann-Whitney U test, the distribution of different UX attributes was the same. Comparing the results between Company A and company A2, the distribution of the UX attribute ‘creative’ differed with a significance level of 0.029. It was easier to compare the medians when looking at the results more closely and running the descriptive statistics and frequencies. The importance of different UX attributes according to their medians is demonstrated in Table 21 for all companies in Case A. The results for each attribute are also illustrated in Figure 11. The results indicate that attributes such as attractiveness and visual aesthetics are less important while safety of use and reliability were perceived as more important for all companies.

Table 21 *The importance of different UX attributes in case companies (Case A).*

	Company A (N=9)				Company A1 (N=4)				Company A2 (N=5)			
Imp.	Attribute	M	x	s	Attribute	M	x	s	Attribute	M	x	s
1	Reliable	7,0	6,78	0,441	Efficient	7,0	6,75	0,500	Safe to use	7,0	6,6	0,894
2	Easy to use	7,0	6,33	1,000	Reliable	7,0	6,75	0,500	Clear	7,0	6,4	0,894
3	Safe to use	7,0	6,33	0,866	Safe to use	7,0	6,75	0,500	Controllable	7,0	6,4	0,894
4	Controllable	7,0	6,22	1,093	Easy to learn	7,0	6,50	1,000	Efficient	7,0	6,4	1,342
5	Clear	6,0	6,44	0,527	Easy to use	7,0	6,50	1,000	Reliable	7,0	6,4	1,342
6	Easy to learn	6,0	6,00	0,707	Predictable	6,0	6,25	0,500	Pleasant to use	6,0	6,0	1,000
7	Supports goal achievement	6,0	6,00	1,000	Simple	6,0	6,25	0,500	Easy to use	6,0	6,0	1,225
8	Efficient	6,0	5,89	0,782	Clear	6,0	6,00	0,816	Predictable	6,0	6,0	1,225
9	Practical	6,0	5,89	0,782	Ergonomic to use	6,0	6,00	0,816	Professional	6,0	5,8	0,837
10	Professional	6,0	5,78	1,093	Practical	6,0	6,00	0,816	Practical	6,0	5,8	1,095
11	Pleasant to use	5,0	5,56	0,726	Controllable	6,0	5,75	1,256	Easy to learn	6,0	5,8	1,304
12	Ergonomic to use	5,0	5,44	1,014	Pleasant to use	6,0	5,75	0,500	Supports goal achievement	6,0	5,8	1,304
13	Predictable	5,0	5,33	1,323	Professional	5,5	5,50	0,577	Creative	6,0	5,6	0,548
14	Attractive	5,0	5,11	1,167	Supports goal achievement	5,5	5,25	0,957	Simple	5,0	5,2	0,837
15	Visually aesthetic	5,0	5,11	1,054	Attractive	5,0	4,25	2,217	Ergonomic to use	5,0	5,0	1,000
16	Simple	5,0	4,56	1,878	Visually aesthetic	5,0	4,25	2,217	Attractive	5,0	4,2	1,924
17	Creative	4,0	3,78	1,563	Creative	4,0	3,50	1,732	Visually aesthetic	5,0	4,2	1,924

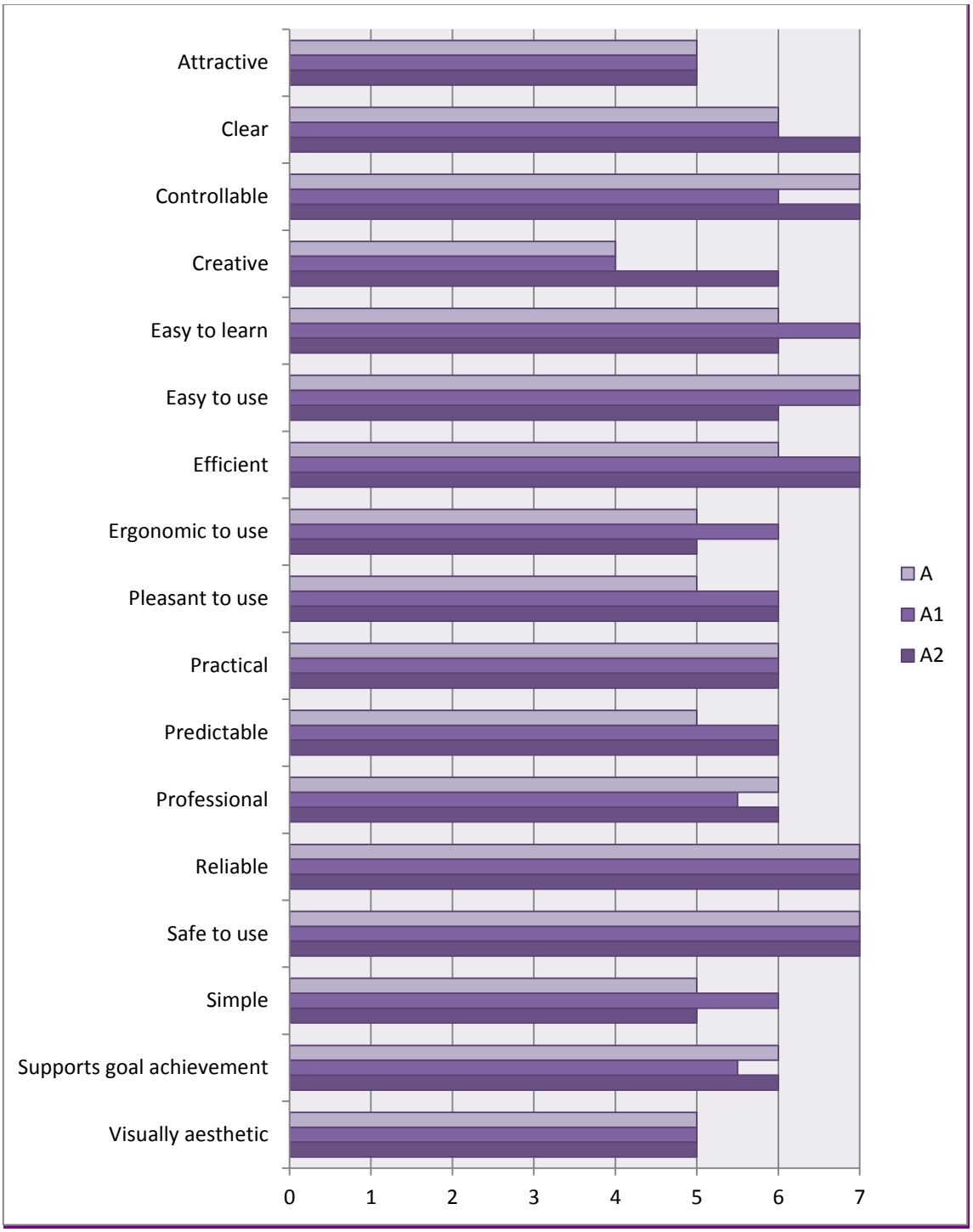


Figure 11 *The importance of UX attributes for different companies (Case A).*

4.2 CASE B

The second case description focuses on supplier company B, which concentrates on designing materials-handling equipment especially for the warehousing industry. Compared to the previous case description, both customer companies B1 and B2 had bought order-picking trucks through a dealer company. Because of this structure in the sales and distribution channel there is a clear challenge in transferring UX-related knowledge to customers and end users through intermediaries.

4.2.1 Striving for better UX in NPD

Case company B specializes in materials-handling equipment and launched a new low-level order-picking truck in 2008. The aim of the development process was to create something radically new that would differentiate the company's offering from competitors. One of the main goals was to increase their customers' total efficiency in warehouse logistics by creating a truck that was easier and faster to use. The previous version had already been in the market for a long time and had not received attention from customers as expected.

The development process started with studying the use of previous versions without setting predetermined technological boundaries for development. This was done by studying the customers' processes on site by observation. The truck use was videotaped with several cameras for one day and analyzed afterwards. This was the first time that this method was applied in studying truck use. During this field experiment, R&D personnel concentrated on observing the work and only a few questions were addressed to the users. The warehouse manager was then interviewed in order to understand the customer's processes and the trucks' role in these processes. The customers were involved in the analysis by watching the videos and brainstorming on what should be developed in the next model.

There were many development ideas initiated from the recordings. For example, one of the most critical changes was the new location of the battery. It was moved from the front to the back of the truck in order to maximize the driver's space and to ease the movement through and around the truck. In addition, the truck was designed with adjustable seating positions so that the driver is able to stand or sit while using the truck. This reduces stress since the driver does not have to stay in the same position for the whole work shift. One of the most novel characteristics was the steering wheel, which resembled game controllers. It was designed to make it easier to learn how to steer the truck for new and especially younger employees.

The development process was mostly carried out by the R&D department. In this case, as well as in the previous case, there were uncertainties about whether it would affect the sales of previous models, if the sales personnel participated in the development of a new model. R&D did get input and customer feedback from salespeople and tried to take these ideas into consideration. However,

salespeople were not actively invited to participate and received the product details only during the internal launch. Within these events, salespeople were also given a product information package designed by R&D and marketing as a sales tool. Marketing was involved in the development process very early on, starting from the phase where the product concept was produced. This was seen as one of the project's strengths since the marketing department was able to create the product's story alongside the development process. This way, they were not dependent on second-hand information since they were a part of the whole process.

From R&D's point of view the development process was seen successful since, for the first time, the use of the product was investigated extensively, and customers and users were involved in the process. The methods for increasing the customers' productivity were also derived from this research. However, there was also some negative feedback about development processes in general, especially from the salespeople's point of view.

First, it was stated that salespeople's' ideas were neglected at some point of the process. Even though the ideas were initially accepted, R&D might change their mind during the development process without consultation from others. This can cause frustration in other parties. One other thing was that both sales and after sales members agreed that before launching any products, the prototypes should be tested with users. They stated that if the faults are discovered afterwards then R&D does not take enough responsibility in fixing these problems. Also, when the product has launched, R&D should be more active in getting feedback from the users and take immediate action to make the product more suitable for the customers.

> *"But then they should be prepared for when the product has been on the market for half a year, they should do the exact same study and save resources for fixing problems. I give them [R&D] a five out of ten for this. You can't wait for the feedback from salespeople; you have to get it actively. If you wait for the feedback, it takes two years to get a sufficient amount of data. And then it takes a year to fix things. If you get the feedback actively, then it takes half a year to acquire the information needed. Now it takes three years instead of one to get all alterations done. So in one year we could have an updated version that would really be a good product. Because no product is good right at the beginning." (B:I7:R&D)*

One problem in developing the products was that there has been a high turnover in R&D. There were several employees who had designed only one truck and moved on to work at another company. This means that once the experiences from previous models and development processes are not communicated to new employees the same mistakes are easily repeated in different models. Also, one of the interviewees found it problematic that at the moment there were only young people with little field experience working in design.

In addition to negative feedback considering the development process, some flaws in the actual product were also detected by the salespeople when talking to potential customers. The truck was

given to all major customers for test drives so that they could learn in advance whether the users approve of the truck in their work. One problem was that once the battery of the truck was moved to another location, the truck became unstable. This occurred while driving and also when parked. This was one of the main reasons, according to salespeople, why larger deals were lost to competitors. Since the truck was very distinct from other models in terms of steering, it took more time for users to get accustomed to how it works. However, when the initial flaws were fixed, and if the users had the chance to test drive the truck for more than just one day, the UX feedback was often positive.

"It was funny, one truck driver had used the same truck for decades. Then I asked him:

- *"What do you think of the new one?" since the old one had levers and the new one could be operated with fingers.*
- *"Well no, it was quite pleasant driving with the levers."*
- *So then I asked: "How's your back, have you had any back problems?"*
- *"Well yeah, I've had some problems with my back."*
- *So I asked, "What about now, do you still have those problems?"*
- *"No, not anymore."*

But he still thought that the levers were good to use. Even though he had had serious backaches before using the new model. And that is the world of truck drivers." (B:I7:R&D)

It was noted that the user's first impression of the truck had a major impact on the perceived UX. Whether the product looks like it might be easy or difficult to learn and use, the driver's prejudice will determine how willing they are to test drive the truck. It also has an effect how the drivers are trained before use and whether they are introduced to the product properly. It was perceived important that, especially in cases where the product is radically new, the training should be comprehensive. This accelerates the learning process which can enhance the experience of using the product.

Designing good UX was seen as very important to the company by all different units. Especially R&D and marketing found that it is a very central aspect of NPD and the core of the company's product strategy. The way of thinking from the experience point of view still mostly originated from R&D, but it was understood in sales as well. The problem was incorporating the UX mindset into dealers and customers as well.

4.2.2 Selling UX through different channels

Considering the external launch of the new product, a separate test-drive day was organized for all major customers. During this event customers were able to drive trucks from different manufacturers and compare them with company B's old and new trucks. Before this event, a cycle test was conducted with different trucks resulting in the possibility to indicate how much more efficient order-picking was with this new model. The aim was to use this information gained from the test in sales argumentation.

> *"We had to have something objective, a clear comparison between different products. 'This feels good, and this doesn't, and this is somehow wonderful to drive'; you can't use something like that. But that [cycle test] is a concrete and measurable thing. There's no denying that." (B:I3:R&D)*

The experience was that the external launch for direct customers was a success, but there were problems getting the same message to indirect customers. The sales operations are arranged so that a part of the sales is operationalized by the company's own sales personnel to direct customers and a part of the trucks are sold to dealers who sell or rent these trucks to their customers. In the dealer distribution channel, company B does not have access to the end customers and the dealers are solely responsible for communicating the benefits of the truck to their customers. In international networks, company B found it hard to get their message through to dealers regarding what kind of sales argumentation should be used for their products. One clear effort was organizing a separate product launch event for the dealers where they could also participate in demos and test the trucks themselves. In addition, R&D could personally explain why changes were made and what the actual benefits were for customers and users.

There was a dispute between the company's units about why the product had not sold as much as expected. From R&D's perspective, salespeople are incompetent and do not know how to use the right arguments for customers, and the dealers are not motivated enough to sell the particular model. The salespeople should appear as experts and try to solve the customers' problems instead of just selling the product. One thing that was found difficult was that not all salespeople, especially the dealers, had tested the product themselves. The R&D personnel stated that it would be easier to argue the benefits of the truck if the salespeople had personal experience in using it.

From the salespeople's point of view, the product has had so many usability problems that the customers have not accepted it. In many cases it was stated that there was nothing that the salespeople could have done to close the deal after the test use evoked negative feelings among the users. In one case, the customer did not believe that the new product would be much more efficient than what they used at the moment. So when a test drive was arranged, the customers were upset with the results when they found out that Company B's product was adjusted to optimal settings and the competitor's product was in the factory settings.

In a typical sales event the salespeople tend to visit the customer's premises, find out their needs and offer a solution considering the warehouse equipment. When the products are taken to the customer for a test drive, the users are provided with training so that they know what kind of features the truck has and what is the most efficient way to use them. During these events, the salespeople also get valuable feedback about the trucks directly from users. According to the interviews, the key in selling is to convince the management of how good the product is and what kind of benefits the customer company gets by purchasing them. When the management gets interested they might take the trucks in for test use. During this period the users have to be convinced that these are the trucks that the company should buy.

> *"In a sense, that is the game; that you have to sell it to the management. When they believe in it, they take them into test use for two months. Then they take good individuals that will prove that purchasing them is of mutual interest. First you have to convince the management, then you have to convince the truck drivers and when you get to that critical spot, then it goes forward by itself. Then you get good results and, as an end result, they will never want to go back to the old one." (B:I8:R&D)*

The demos and test drives were considered an important part of the sales process by all interviewees. It is a good way especially for management to make sure that they are making a good investment that leaves the users satisfied too. However, with products that are radically different, it is important that the test-use time is long enough so that users have the chance to adjust to a different way of driving. If it is only for half a day, the changes might feel too overwhelming and could lead to resistance against the new product. In addition, effort should be invested in teaching the users all new features and how to use the truck. Without proper guidance, it can take too much time and effort for the driver to learn how to use the truck correctly on their own. One idea was to show a video of how an experienced driver would use the truck.

> *"It is the same with consumer products. You might recognize that someone is using the same product as you, but they have found something else in the product that you were not even aware of. So if you had seen for yourself how others are using it in the beginning, it would have probably been easier to learn how to use. All those thousands of features that it includes, you could have learned the useful ones." (B:I2:R&D)*

In some cases, no trucks are taken for test drives and the management simply decides which trucks to purchase. If the warehouse manager chooses the trucks without consulting the users and the users do not approve of the decision, then they will probably not buy the same truck again. However, if the UX is positive, then it is easy to sell more trucks to the same customer.

Considering sales material, R&D and marketing personnel gather a sales information package that introduces the new product to salespeople. The package contains product descriptions, PowerPoints, price lists, brochures, pictures and videos. There was a lot of effort put into renewing some

of the material. For example, the demonstration video was made to look like a game where the driver completes tasks with the truck against time. It was meant as marketing material that would speak to younger drivers who have a lot of experience playing video games. The point was to show that the truck is easy to use and also bring out all the key features.

The product benefits for customers are also listed in the material, but R&D argued that in its current form the material is too dull and it does not encourage people to read it in its entirety. Somehow the story behind the product should be better presented so that others would understand why the product is designed the way that it is. One idea was to use more videos that would thoroughly demonstrate how the truck can be used. With these videos, it would be easier to bring out the users' voices and share their feedback to potential customers. A great amount of material from the user studies could be utilized to demonstrate how the old and new trucks differ from each other. The problem with these videos was that they require a lot of effort to produce and they are difficult to update compared to slideshows.

There was also an aspiration to use more interactive and mobile tools in selling the products. For example, the use of tablet computers was mentioned in the interviews. It was found easier to have everything needed along with the salesperson if all material was downloaded on the tablet. The point would be to make the message from R&D more clear and unified to all customers. If the realization of this plan was done so that it would make information for the sellers easier to access and use in sales events, then there might be less resistance in changing the traditional sales method.

When it comes to sales argumentation, efficiency was brought up in many conversations. Since this argument was something that could be based on research results, it was clear why R&D and marketing personnel would want it to be used for attracting customers. The benefits of better efficiency were seen as savings in time and money. However, one of the salespeople noted that this kind of argument can only be used to major customers with a vast number of trucks and a high degree of utilization. If the customer only has a few trucks and they are not used a lot, then it does not matter how efficient it is. It was also found problematic to prove the benefits of better efficiency to a customer.

> *"But the problem is how to measure it. Do they work more there, or are they on a break more often, when they are able to complete their tasks faster. And another thing is if it is that much more efficient, are the other aspects of the truck good enough, does it please you otherwise." (B:I9:S&M)*

Industrial design was also seen as a good differentiator from other manufacturers and a good topic for starting a conversation with potential customers. Company B felt that their products must look interesting in order for customers to get interested in them. However, industrial design is not just about how the product looks; it has to be functional as well. Based on the interviews, one of the problems with design products is that they can often be perceived as expensive when in fact

industrial design should be considered as something that improves the usability of the product. Better usability can affect the total cost of ownership in a positive way. A few interviewees stated that poor design can inhibit truck sales, but good design is rarely a deal breaker. It is just something that has to be included in a product.

Arguments considering user benefits were also noted. If a truck is more ergonomic there could be less sick leaves, which can lead to cost savings for the customer. There was also discussion about the total cost of ownership including price, operating costs and cost savings from having satisfied employees. One of the interviewees stated that in the end it should be more important for the employer that users like to do their job and are willing to commit to the company because every investment done for the employees will pay itself back eventually.

> *”Personally, I’m absolutely sure that the smartest investment considering a truck is one that users like, accept and allows them to do their job with a smile on their face whether or not it was the cheapest thing to acquire or use. If not for anything else, than at least the employee enjoys their work and does their job better, maybe more precisely. And they come to work gladly tomorrow, the day after tomorrow and do the work for, ten, twenty, thirty years.” (B:I9:S&M)*

It was also noted that sales arguments should be customized for different parties. For example, the warehouse managers might appreciate that the trucks are maintenance-free and have low life-cycle costs. For higher management, things such as design and brand image can be more appealing. The user does not care about the cost of the tools they use but if they are paid by the piece, then they are interested in how fast they can get the job done.

When discussing how UX is employed in sales argumentation, it was stated that it depends on the target, whether it has an effect or not. For example, a person working in the purchasing department might only be interested in the actual measurable costs. In this case it would be useless to talk about the benefits of good UX. In other cases, good UX can have a major impact on the investment decision when it is straight feedback from people who have already used the equipment.

When the interviewees were asked about the company’s competitive advantages, the most important factors were good local service, thorough understanding of different user groups and their needs and award-winning industrial design. The company has gradually shifted into the way of thinking about different users and their requirements in trucks. Previously a product that was designed for a specific type of user group was assumed to be suitable for all kinds of users. Now there is an understanding that one product might have very different types of users and it still has to be suitable for all.

UX was also clearly seen as a competitive advantage. The problem was how to measure and prove to the customers that the product is at a premium-level in UX. It was also stated that being

number one in UX could bring more value to the whole company brand. Especially in Central-Europe the competition is mostly based on price, and the possibility to differentiate is very limited. But if the supplier is able to convince the customers of what they get with better UX, then they can make the deal.

> *"Many competitors focus more on technology or cost optimization. We see that one has to be roughly on the same level in those categories and then you put the user first." (B:I2:R&D)*

As a summary it could be noted that although there is a clear understanding about UX and its importance in sales, many challenges were identified in getting the message to customers. First of all, there were difficulties transforming the knowledge about UX into a clear message that would reach the customers and users, even through dealers. The sales material should be renewed so that UX would be emphasized more. One example was using videos filmed at customer sites in order to demonstrate the actual use and UX for potential customers. Demos and test drives were perceived as important in providing the experience to users before purchasing trucks. However, with a radically new product the time to get familiar with the truck can take more than a few hours. The first impression can have a tremendous effect on the UX which is why it should be ensured that usability problems are limited before taking the product for a test drive.

4.2.3 Buying better UX or just good trucks?

Investment decision criteria from the supplier's viewpoint

In this case as well as in the previous, the size of the company affects which people from the customer company are involved in the technology investment decision. In many cases the warehouse or logistics manager is the person mainly responsible for carrying out negotiations with different suppliers. In larger and especially international companies the decision can be made by purchasers. This was seen problematic from the supplier's point of view, since purchasers have strict guidelines considering product costs. In these cases, it is difficult to argue the total benefits or UX of a product if the price is all that matters and the users' opinion is not taken into account.

The company's size also affects the investment criteria. According to the interviewees, for smaller companies the product itself and its characteristics can dominate the decision. For larger companies, the service package can be the deal-breaker. It was even stated that it would be a bold decision for a customer to purchase trucks from a supplier that does not offer local after-sales service. The investment criteria might also include total cost of ownership, product ergonomics and the brand image and reliability of the company.

The users' experience becomes apparent in a situation where they are able to test the products before making a decision. Managing demos and delivering trucks to the customer for test drives gives the users also an opportunity to affect the selection of suitable machines for their work. The manager might also try the products but since their daily work is not dependent on the trucks it is

the users' task to tell what is good or not good about each product. Although users might not be involved in negotiations they can indirectly impact the investment decision. It was even studied by the company that in 65 per cent of customer cases the users get to decide which truck they wanted for their work. This was seen important since it might affect the users' work motivation if they were a part of the decision-making process.

> *"Just because it is a work tool then we come to the psychological aspect. If you have been involved in purchasing this tool which pleases you and is, so to say, your choice, then you can accomplish more with it. Or even if you don't accomplish more, then at least you are happier in doing your job. And you don't complain if there is something wrong with it, since you have participated in choosing it. But if someone else just gets you one, and there is anything about it that doesn't please you, then they become much bigger issues. And it can affect your work, motivation, efficiency and your overall attitude." (B:I9:S&M)*

However, test drives are not always arranged; sometimes the management makes the investment decision on their own or the customer is taken to a reference place to see the trucks in use at a similar venue.

When the interviewees were asked about the product benefits, process efficiency and user-friendliness were emphasized in the discussions. Although the product was somewhat more expensive than competitors' trucks, if the process is faster, then the workforce need is decreased and more tasks can be completed in less time. This again affects the total expenses.

Investment decision – customer company B1

The first customer case company B1 built a new central warehouse in 2010 on an old real estate. When moving to these premises they also acquired new trucks which were needed in order to get the material logistics running. After this investment, company B1 rented additional trucks to respond to the increasing capacity at the warehouse. Both purchased and rented trucks were acquired from one dealer who supplies company B's products exclusively. In addition to trucks, they offer shelving units, truck maintenance and warehouse logistics planning.

The investment proposal was made by the warehouse manager, who was in charge of the planning of investments, inviting suppliers to tender and selecting the products to be purchased. Although the warehouse manager is practically in charge of the investment decisions they need to be accepted by the logistics manager, Chief Financial Officer or even the board of directors.

According to the interviewee the company had some previous experience with company B's products via short leases. When searching for truck suppliers company B was considered a competitive option since, according to the interviewee, it was the leader in the Finnish market by market share. The company's brand was also well-known which confirmed the image of a safe and reliable supplier. One criterion for the finance department was the residual value of the trucks, and for these

particular trucks it was estimated higher than for competitors. A budget was made for the whole warehouse and the trucks were included in the estimate. Although the price was a major issue for management, it was still not a deal-breaker. Company B's products were not the cheapest, but in the final investment decision other aspects mattered more than price.

Other important criteria were the supplier's reliability, the truck's functionality and the terms and conditions of the service contract including the guarantee period. It was important that temporary trucks were offered within a short amount of time in case the purchased trucks broke down. One important aspect was the trucks' speed and controllability since all activity at the warehouse is based on how many items can be collected in a given time. The trucks' durability was one key criterion since the hall floor is uneven with construction joints. The premises itself gave some restrictions for the trucks so the selected products could not be made of cheap components.

The warehouse manager had co-operated with the dealer for almost a decade, even before working for company B1. The interviewee assessed that the long relationship probably also played a part in the investment decision. Since the dealer was already familiar with the company and they were considered reliable and trustworthy, it was perceived a safe choice to continue business with them. The dealer was also involved in building the central warehouse and its shelving and did detailed specifications on the blueprint. According to the dealer, the negotiations always start with understanding the customer's needs instead of trying to sell products. Whenever there are new products that could suit the customer, the dealers arrange events where they can be tested. Otherwise, they do not concentrate that much on selling. The interviewee believed that one reason for this is the leasing business; it can be more beneficial for the dealer to rent trucks instead of selling them since the profits from the rental charges can exceed the initial purchase price.

In this case, the trucks were not taken in for test drives at the warehouse and they were not tested by users at any other premises either. Although no complaints have been made so far concerning the trucks and no one has asked why they did not get to test drive the trucks in advance, it was questioned whether it could have been a good idea for the users to participate in the decision-making.

> *"One thing that could have been from the buyer's perspective, as I think about it afterwards as a supervisor, is that we could have taken the users with us. Since I don't drive anything in my work, although I have driven almost everything in my previous life. I've always counted on my knowledge and that I know what kind of features are required. And I've based all decisions on my own knowledge." (B1:I1)*

When asked about the sales arguments, efficiency was the most prevalent one that they recalled. It was proven by the research results that the truck was faster than competitors but the interviewee was not aware of who conducted the research. Also being domestic, reliable and having a good residual value were argued as benefits. UX-related aspects such as ergonomics and user friendli-

ness were also highlighted, but the interviewee could not recall how much weight was given to them.

> *"I think most of the weight on the decision goes to how efficient it is and the price and technical features. And then for the softer values goes 20 or 10 per cent of the total cake." (B1:I1)*

When discussing whether UX could be a deal-breaker, the interviewee was certain that it can have an impact on an investment decision. In their case, it was not crucial since they did not go to other warehouses to see how they work or ask users for their experience with trucks. They were also keen on the idea that the dealer would bring other potential customers to their warehouse for benchmarking. Compared to competitors' products, this particular truck model was seen as easy to use and ergonomic, since the steering wheel resembles like one in a car where one can look straight ahead in the direction they are driving.

> *"In addition, when the users are young men, I don't know if you can say that it is sexy, but somehow technically interesting, when it looks like a UFO or a rocket or something." (B1:I1)*

The interviewee could not comment on whether the use of the truck had decreased the amount or duration of sick-leaves. However, it was noted that the users' viewpoint on whether or not their tools are good or bad does affect work motivation. Although it was not measured in any way, it was a common conception that it is more pleasant to work with good tools, especially in order picking where the workers have strict minimum rates and requirements.

Investment decision – Customer company B2

Customer company B2 has used company B's trucks for many years and they have had only a few trucks from other manufacturers. At their central warehouse they have ten to fifteen employees handling order picking depending on the season. The personnel's previous experiences with company B's trucks were very positive and they were described as reliable working tools. Because of this, the customer company had high expectations for the new trucks — that they would be even better and more agile. The feedback on the trucks was that they succeeded in meeting the customer's expectations. It was seen as a modern device which was an upgrade of the previous models.

The reason for acquiring new trucks was that part of the old trucks, which were purchased in the mid-80s, were coming to the end of their lifecycle. The target was to find trucks with better ergonomics that were more efficient and handier compared to the old models. Compared to the previous case, company B2 had no lease trucks. They also purchased all their trucks through a dealer. The person in charge of the investment decision was the logistics manager. They had purchased from the same dealer before and the logistics manager had co-operated with them already when working for other companies. Company B2 has grown vastly since the mid-80s and they have had the same contact person from this particular dealer from the very beginning. The contact person is

very familiar with the company's processes and needs and is able to provide solutions for the customer's problems.

In the negotiation stage company B2 had three other options to choose from. In the final stage they made the choice between two suppliers. As investment decision criteria it was mentioned that company B's truck was slightly more advanced than the competitor's model. In addition, the price was reasonable and the truck had interesting features which were considered beneficial for the customer. For example, the increased space for the driver, new agile steering and higher-level order picking were seen as advantages which also made the truck more user-friendly. It was also an objective to not have trucks from many different manufacturers. The interviewee had a long history with the other dealer from working in other companies while the contact persons at the competitor company had changed many times. However, it was hard to evaluate the meaning of personal relationships in the final decision.

> *"We have to refine the efficiency of operations and costs all the time. So that is what counts in a situation where we have two equal options. If the price of the other product gets out of hand, then there are no grounds for the decision, no matter how nice the sales guy is." (B2:I1)*

When asked about the dealer's efforts, they received positive feedback regarding how they communicate with the customer in sales situations. It was said that they bring out the benefits of each product and know what will not interest the customer, even if those features are highlighted in the manufacturers' brochures. The efficiency aspect was brought up in negotiations and it was seen as a good argument to use in the investment proposal for the board of directors. When asked about the meaning of brand image, it was seen as a positive aspect as long as one does not have to pay more for it. A good brand was seen as a sign on credibility, and it was easier to choose a well-known manufacturer.

Company B2 purchased the updated version of the model with a rising platform in order to carry out higher-level order picking. Since it was brand new at the time of the negotiations, it was not possible to go to a reference place or to test the trucks in advance. Because of this, it was stated that the customer had to rely greatly on the dealer and their sales pitch. Typically trucks are taken in for test drives for a week or two and every user gets a voice. If it is noted that a truck is not suitable for the warehouse environment then it does not get picked. This time the users did not have a chance to influence the investment decision by test driving.

When discussing UX it was seen important that the company only buy work tools that the employees will use and that will not harm them in any way. The logistics manager usually does not take into consideration trucks that are not of equal value and high quality. If the truck is not durable, even if it does not cost much to purchase, it will eventually be a more expensive investment because of the maintenance expenses and the shorter lifecycle. However, it was considered difficult

to evaluate the cost-savings derived from good UX. For example, it was found almost impossible to discover a causal connection between good ergonomics and less sick-leaves in order picking.

There was also discussion about the perceived UX considering the new trucks. It was said that since they were so distinct from previous models there was some resistance in the beginning. Since the new models were delivered in the middle of a high season, the employees that were accustomed to the old trucks did not want to start using the new model as it would have slowed down the work. However, after driving the truck for a day and learning how to use it, the employees did not want to exchange it for the older model anymore. It was perceived as better to use than the previous models.

Comparing the views of the supplier and customer companies

According to the supplier's interviews demos and test drives were considered important in the sales efforts, but these were not arranged in either of the customer cases. Although in 65 per cent of customer cases the users got to decide which truck they wanted for their work, the users were not able to influence the investment decisions in these customer cases.

The most important reasons for acquiring these particular trucks were positive previous experiences with the supplier's products, good relationships with the dealer's representatives, supplier and product reliability and technical features. The supplier brand was considered well-known and the supplier itself was reliable in their business. The price and lifecycle costs also affected the decisions, as well as the terms and conditions of maintenance service.

However, UX was not highlighted as such in the investment decision criteria even though it was considered important that the users approve the machines they are working with. In this case as well, the value of UX is realized cumulatively as the previous UX and CX with the supplier and their products affect the investment decision in an indirect manner. Also, both parties emphasized the importance of efficiency and it can be regarded as a combination of ease of use, steerability and speed of the product.

The people from company B's R&D department were also asked in a survey why their potential customers would want to buy their products instead of competitors'. The same factors came up as in the previous discussions on product benefits: efficiency, ergonomics and lifecycle costs. In Table 22 there are inserts from the six respondents of the questionnaire for R&D. The efficiency and ergonomics of the products were seen as benefits for the customer. In Table 23 a summary is presented from the customer interviews (two interviewees) about their actual technology investment criteria.

Table 22 *Reasons for why customers would buy a truck from company B from R&D's point of view.*

Category	Description / quote
Efficiency	Because it is faster in order-picking than any other manufacturers corresponding product. So the truck has a short payback period.
	Desire to increase work efficiency (2)
	To make the order-picking process more efficient.
Ergonomy	The truck is ergonomic and therefore reduces the users's strain in their work and indirectly reduces sick leaves and other costs for the employer.
	Ergonomy (product feature)
	Because it helps the users to do their job in an easier and more ergonomic manner than with most of the competitors trucks. This brings benefits to the customer with faster processes and decreased sick leaves.
Other	Brand
	Good design
	To prove the workers that they have purchased a fine product.
	Life cycle costs / functionality of maintenance
	A single customer buys the product because of an interesting story. A big breakthrough would require an increase in the supplier's credibility among target customers. The product should be sold as a part of a bigger totality the differentiator could be, for example, automated versions of the product.

Table 23 *Summary of customer companies' technology investment criteria (Case B).*

Category	Description / quote
Best in market	Superior in the Finnish market regarding market shares.
	It is slightly more developed compared to the next best alternative.
Brand	The brand is so familiar, somehow a safe choice.
	A familiar brand brings credibility, when we know that the supplier has been in business for a long time.
Ease of use	Of course it is really easy to use. It is probably to main point.
Good previous experiences in doing business	The dealer is familiar and a safe choice. They know what we need since we have done business before and the trust has developed throughout the years.
Life cycle costs	Company B's products have a good residual value.
Price	Of course the price is one of the biggest things, since the investment must meet the budget.
	It is pretty important for us that the price is right.
Product reliability	Functionality.
	We have to have the kind of products that we can rely on.
Service contract terms and conditions	The service contracts are of course one important part, and that we have reliability of operations.
Supplier reliability	Reliability.
	Reliability on the sales pitch in that the product is as good as it turned out to be.
Technical features	Speed was one pretty important factor.
	Steerability.
	It had some features that we found would further our work.
	The steering is more agile.
	We have compared the products' technical features, for instance, the durability of the battery has to be so that we don't have to charge it during work time.
Warranty	It also has an effect what kind of warranties we are able to negotiate for each supplier.

4.2.4 Controllability and efficiency as potential design targets

When describing the drivers of good UX the people from R&D emphasize ease-of-use in the open-ended section of the questionnaire. The truck should feel like the users' own and fit like a glove. However, when rating the importance of UX attributes, ease-of-use did not fit into the top ten issues although it received a median of six out of seven. Other aspects mentioned were that the truck should be easy to adopt and enable a faster completion of work tasks. There was also mentioned that the product should be faultless since even little flaws might lead to a negative UX. This was also emphasized when interviewing the salespeople; it is hard to sell a truck with flaws since the users will not accept it. Using the truck should also be pleasurable and safe from the users' perspective. The results from the open-ended question are presented in Table 24

Table 24 *Drivers of a good UX from the viewpoint of R&D (6/8 respondents)*

UX Driver	Citation
Easy to learn	Easy to adopt.
Easy to use	Ease of use.
	The machine feels like your own from the very first use.
	Fits your hand like a glove. You can get a good grip of the wheel and it is easy to steer. It is easy to come into the truck and it is easy to get off to collect products.
Efficient	Enables making work fast.
Pleasant to use / Pleasure	When one is riding the truck it should give a pleasant experience, that with this is what gets the job done and it is a pleasure to use.
	The truck should bring pleasure to the user from one day to the next.
Reliable	Small things matter. In building a long-lasting user experience small faults wreck everything. One has to focus on fixing these faults.
Safe to use	Safety of use.

When comparing the results of the importance of UX attributes between the supplier and customer companies, the Kruskall-Wallis test indicates that only when considering the attribute 'attractive' should the null-hypothesis be rejected with a significance level of 0.043. The null hypothesis was that the distribution of different UX attributes is the same across categories (companies). Comparing the results between supplier company B and customer company B1, the Mann-Whitney U test indicates that the distribution of different UX attributes did not differ from each other in a statistically significant manner. By running the same test for supplier company B and customer company B2, the distribution of the UX attribute 'attractive' differed with a significance level of 0.011. The importance of different UX attributes according to their medians, means and standard deviations is demonstrated in Table 25 for all companies in Case A. The results for each attribute are also illustrated in Figure 12. For all companies, aspects such as efficiency, controllability and reliability were perceived as important. On the other hand, creativity and visual aestheticism were considered least important attributes both in using the product and in product development.

Table 25 *The importance of different UX attributes in case companies (Case B).*

	Company A (N=9)				Company A1 (N=4)				Company A2 (N=5)			
Imp.	Attribute	M	x	s	Attribute	M	x	s	Attribute	M	x	s
1	Efficient	7,0	6,75	0,707	Efficient	7,0	6,75	0,500	Controllable	7,0	6,6	0,548
2	Reliable	7,0	6,50	0,926	Controllable	7,0	6,50	1,000	Pleasant to use	6,0	6,2	0,447
3	Safe to use	7,0	6,38	0,916	Easy to use	6,5	6,50	0,577	Easy to use	6,0	6,2	0,837
4	Pleasant to use	6,5	6,50	0,535	Ergonomic to use	6,5	6,50	0,577	Ergonomic to use	6,0	6,2	0,837
5	Easy to learn	6,5	6,38	0,744	Pleasant to use	6,5	6,50	0,577	Reliable	6,0	6,2	0,837
6	Professional	6,5	6,38	0,744	Easy to learn	6,5	6,25	0,957	Safe to use	6,0	6,2	0,837
7	Supports goal achievement	6,5	6,25	0,886	Practical	6,5	6,25	0,957	Practical	6,0	6,0	0,707
8	Attractive	6,5	6,13	0,991	Reliable	6,5	6,00	1,414	Easy to learn	6,0	6,0	1,000
9	Controllable	6,5	6,13	1,126	Clear	6,0	6,25	0,500	Efficient	6,0	6,0	1,225
10	Ergonomic to use	6,0	6,38	0,518	Safe to use	6,0	6,00	1,155	Professional	6,0	6,0	1,225
11	Easy to use	6,0	6,25	0,707	Supports goal achievement	6,0	5,75	1,258	Predictable	6,0	5,8	0,837
12	Clear	6,0	6,13	0,835	Professional	5,5	5,50	1,732	Simple	6,0	5,8	0,837
13	Practical	6,0	5,88	0,835	Attractive	5,5	4,75	2,630	Clear	6,0	5,6	1,140
14	Predictable	6,0	5,88	1,126	Simple	5,0	5,00	0,816	Supports goal achievement	6,0	5,6	1,140
15	Simple	5,5	5,38	1,408	Creative	5,0	4,50	2,517	Attractive	5,0	4,0	1,000
16	Visually aesthetic	4,5	5,25	1,488	Predictable	5,0	4,50	2,517	Visually aesthetic	3,0	4,0	1,414
17	Creative	4,5	4,75	1,488	Visually aesthetic	5,0	4,50	3,000	Creative	3,0	3,6	1,817

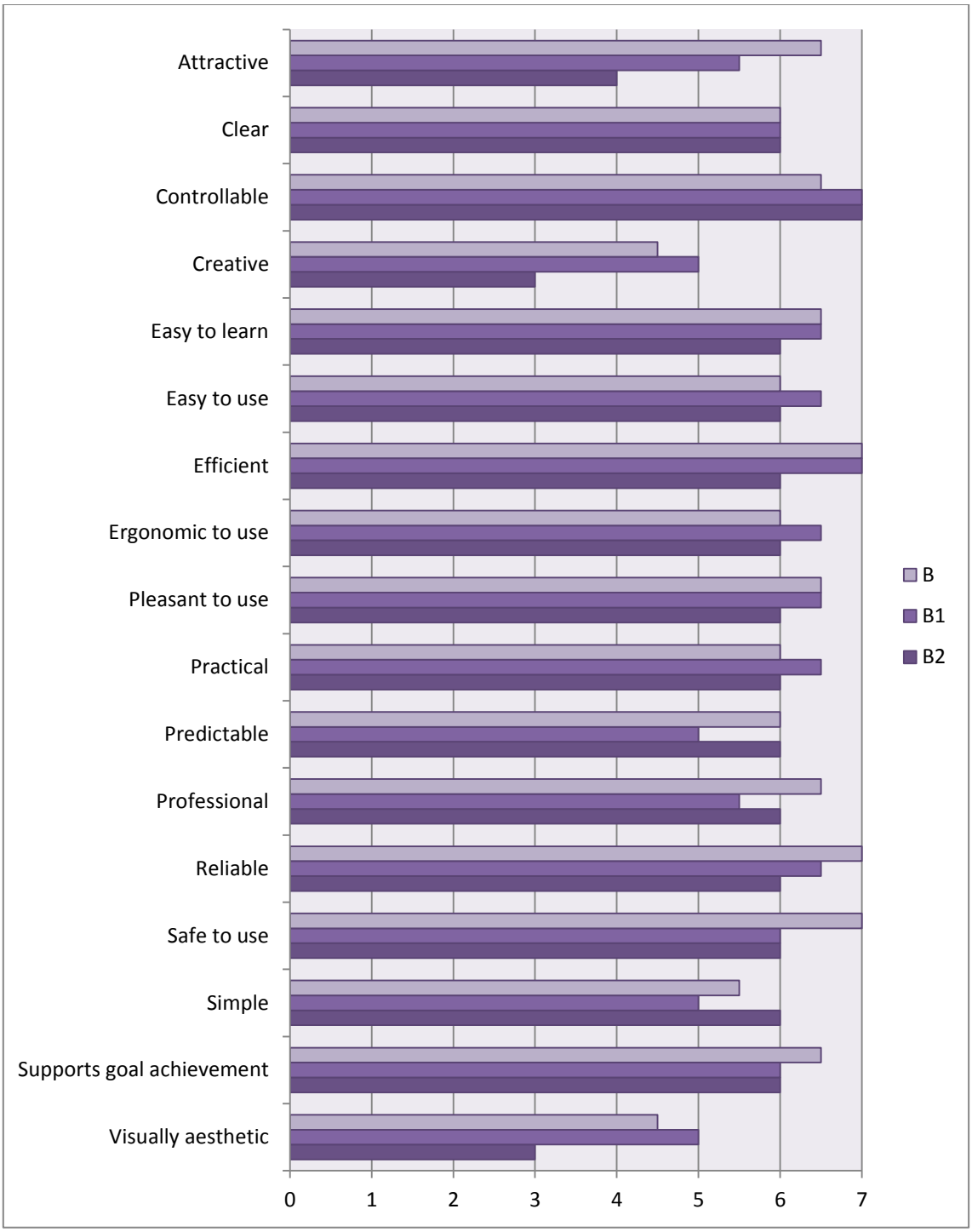


Figure 12 *The importance of UX attributes for different companies (Case B).*

4.3 CASE C

Company C concentrates on designing and building automation systems for the B2B industry. The two customer companies differ from each other considering the relationship length with the supplier; Company C1 bought their first control system from company C in the 1980s and has purchased all updates from the same supplier, whereas company C2 was doing business with the supplier for the first time. From the supplier's and the customers' point of view, system and supplier reliability were considered important in choosing company C's offering.

4.3.1 UX in incremental innovations

The research focused on a control system which was first introduced by company C in the 1980s and then further developed. The latest version was launched in 2011. Compared to the previous two cases (Case A and Case B), this product was not a radical innovation itself, but the incremental development included several radical innovations such as new technical features that provide notable benefits to customers' operations.

Considering this incremental development, both technology-push and market-pull approaches were identified. Especially in the process control development there were clear indications of how the technology lifecycles and changes in operating systems define the need to improve existing technologies. However, the needs and requirements derived from customers have an impact on what features and designs are included in user interfaces. Many technological changes are already planned and written in the company's strategy. Despite this there are often difficulties in concentrating on the right things; when concentrating on minor issues the overall picture is forgotten, and when concentrating on larger issues it takes more time to get financing or get started with the project since the end results might not be clear. However, the focus is shifting more towards responding to customers' needs.

Many of the features which had novelty value were invented in the early 21st century. These included features to analyze the state of production processes and detect disturbances in production. This makes it easier to see and analyze what happened, when it happened and what actions were taken to recover from production disturbances. These features were developed based on the results of previous research projects. In a typical development process the product manager is in contact with salespeople, after-sales people and delivery projects. From these interest groups, R&D gets feedback about customer needs.

Feedback can also be gained through people who work in training the users and customer service. This kind of information is then recorded into a demand-base that all observed requirements go through. The demand-base is open for all employees, and anyone can record feedback from customers or users. However, problems were detected regarding the way requirements are processed.

Although they are handled regularly, the requirements only get realized when a proper development project starts, so it might take time before the customers' needs are answered.

It was also stated that there could be more collaboration among the companies' different departments before and during these development projects. For example, S&M could have a bigger role; however this is dependent on the strategies made by managers. During the product launch, marketing was already involved in the requirement and concept specifications and feasibility studies. Currently the trend is that marketing deals with the product only when it is finished so that the process would be as efficient as possible and the lead-time between different functions could be decreased. This was seen problematic since the marketing personnel do not know the story behind the product if they are not involved from the beginning. In addition, there was noted some unrealized potential in the communication between R&D and training. More effort could be made from both parties in communicating the needs of users.

> *"We communicate the wishes of customers since we have a couple of thousands of course participants in a year, so we deal with customers rather a lot. And in fact we have always wondered a bit how little this possibility to gain feedback is utilized." (C:I1:Tr)*

When discussing whether and how customers are involved in a development process the same concerns emerged as in the previous cases: the sales of the previous models might decrease and the presented features are often expected to be in the next version of the product. Also it was stated that customers' might not know what they want or need until they have used it. During the last years, ideas were tested mainly with internal customers. When it comes to users, the people working in R&D try to understand their work and, from that basis, design new features which would help users in completing their work tasks. However, the dialog between R&D and users was found difficult since it is not easy to communicate about features.

> *"When you bring a prototype then it easily guides the users' thoughts that it's a given, and then they comment 'this could be improved and that could be improved'. This kind of feedback is valuable in detail, but based on it I have to see something broader behind the work. Like 'Wait a minute, when I listen to you more carefully, is this the question actually?' and then you can make suggestions and open the conversation. I've tried more to get an understanding of the work and its goals and raise things up based on my findings." (C:I5:R&D)*

In addition, it was found hard to truly understand the tasks that users carry out in control rooms without personal experience of the kind of work in question. It requires many hours of observation and asking elaborate questions of the users. When asked what kind of information is the most important in designing the control system, the know-how of the daily routines was considered vital. Some interviewees felt that there was too little effort in acquiring data proactively and that most visits to customers' premises are related to problem solving and usability testing. The problem was

how to allocate resources to user research and design so that there is a balance between these two tasks.

It was difficult to find a right time for user surveys in the development process. If they are conducted in an early stage it requires more preparation effort, but the input at that stage can be more beneficial since there is still room for alterations. If the study is conducted later on, the product itself can be more ready but the user might have a chance to impact on the final design only on a detailed level.

> *"I don't have anything against it [usability testing] but since we're all very busy all the time it feels like not everything needs a usability test. But they're ok, I'm not saying that. Of course if there's a good target then it's worth doing. But then again some things seem so clear that it's not worth it." (C:I3:R&D)*

The role UX in the company's strategy, and if there is a consistent perception among employees about UX and its importance, was also discussed. Currently, it was clearly not a part of the company's strategy to emphasize UX in different functions. Also, the interviewees felt that the company's own management does not even understand what UX is and why it should be a central focus in everything that the company does. Some even believe that the management's perception of good UX only involves the visual appearance of user interfaces.

> *"Like if you ask our managers what they think about user experience, they'll say: 'It's very important'. But what it involves is a whole other thing. And they don't organize anything around it or even generally understand that world. Or at least I don't believe they do." (C:I5:R&D)*

> *"The major conversations that we've had with the management group have been about the colors and what kind of background color we have or the color of the keyboard. But they are not really the core of user experience and hopefully as many as possible understand that there's more to it than the issue of color or font, which are of course important as well." (C:I8:S&M)*

However, there is a tendency towards a UX-related mindset within the company that has been gradually brought forward by specific individuals. The different targeted emotions have been highlighted in the company's advertisement. In the R&D department, UX was seen as an emerging theme and the understanding of its importance is starting to expand among the employees. Even in sales and marketing UX was perceived as important. But according to the interviewees it takes time to get the message through inside the organization so that UX would become everyone's interest.

"Sometime later they will come through in an organization. But it takes a long time in these kinds of organizations for it to become property of the whole company; it might not ever happen. There will always be new employees that have never heard of these kinds of things because we have a tendency to forget the old things and focus on the new. Even though we have very new and fancy things, we don't remember to tell our customers about them." (C:I4:R&D)

From the salespeople's point of view it was also stated that one has to be personally active to get information about UX and produce material that emphasizes the message to customers as well. They felt that R&D does not provide information beyond measure to other functions.

To sum up it can be noted that in incremental innovations the UX targets might not be as apparent as in a development process where a company is producing something radically new. Although there have been efforts to understand the users' work and the feelings the system should evoke, it was still questioned whether testing the products with users is required or necessary. However, it was still seen important that data would be acquired from customers and users more proactively than what is done in the current situation. UX was perceived as important throughout the operative levels in the company, and the reasons for enhancing UX was acknowledged as well. Despite this, UX was still not understood on the management level and was not part of the company's overall strategy.

4.3.2 Using references and demos in demonstrating UX

Typically new products are introduced once a year both internally and externally. In addition to this, seminars for customers are arranged. Sometimes the company is able to attract people who actually participate in investment decisions. During these events the products are introduced via demos and slideshows. At the moment, the demo presentations are arranged by one person who is responsible for the whole demonstration. However, it has been noted that the nature of the demo introduction could be more effective and interactive so that customers would get more out of it.

It was also found difficult to get actual product users to attend these events or to get in contact with users otherwise. One successful example of doing this was having a two-day event at the customer's premises where the suppliers were available for twelve hours each day. After the management is committed to an arrangement that every user would attend during their shift it is easier to introduce the system to them personally. Another idea for getting in contact with the users was to have a Road Show, where the supplier would give short presentations during a convenient time for the users. It was argued that the best way to get in contact with users is to visit their factories and control rooms and see how they work on a daily basis and how the control system either assists or hinders them in completing their work tasks.

As sales material company C uses references in addition to slideshows and demos. References were seen as a very important way to express how the system is successfully used in an actual control room environment. It was even stated that the whole market is based on references and if one fails to succeed in creating good references, then this knowledge will spread via word-of-mouth to customers in every market area. One idea considering the use of references was that the salesperson would have a list of references from which they could choose a plant similar to the customer and play the demo on sight. All this information of different customers' control systems is available, but work has to be done in order to convert the data into something that can be illustrated to the customers.

> *"Our whole business is based on references. And because of that the question of the user interface is the most important one, since you can't get a good reference if the users are not satisfied. If the user experience is negative then it won't become a reference because you cannot build an article based on that. Or if you go for a visit then it doesn't matter what kind of figures you put on the table of how good it is or how good of results you can get. If the users disagree then it doesn't work as a reference." (C:I8:S&M)*

The purpose of the demos is to illustrate how the system works in a similar environment, what kind of technical features are embedded in the user interface and how the system is used to manage , for example, fault situations. There is also an objective to produce video material that could be downloaded onto YouTube in order to attract a larger audience. Demos are used especially in situations when it is not possible to get the customer to a reference place. The demos are often left for the customer so that they can explore it in more detail in their own control room.

The customer negotiations start with compiling tender/bidding documents which include the functions and technique included in the factory automation. The documents are then reviewed by the customer so that the technical specifications from different suppliers are on the same level. After this the customers base their decision on predetermined requirements. According to the interviews, the problem is that in some cases price can determine, with a 70 per cent influence, which automation gets selected. The salespeople highlight the lifecycle costs of a control system and that the solution with the lowest price might not be the cheapest in the long run. Service should also be local and available in the customer's own language. The systems are often given an availability guarantee that the automation cannot disturb the process. If it does, then the supplier must pay a usability fine, which reduces the price. This kind of warranty is usually valid for two years. Since project timetables have become tighter there is less time for designing, and availability tests should be done beforehand. Because the introduction of the new technology is done in a short time, there is no time to fix problems anymore at that stage. Everything should be managed before the system is built on the customer's premises.

Customer relationships are often long-term and the salespeople know their customers personally. This helps in gaining the customers trust as a reliable partner. The lifecycle for factory automation can last for around twenty years. And according to a sales person, in power plants the same people still work at the customer company when negotiating for a new one. This is why it was seen important to keep good relations with the customer, so that it would be easier to start negotiating for a new system with an old customer. It is also beneficial for the customer, when dealing with a supplier who is already familiar with their production and not everything has to be explained from the beginning.

In order to sell a control system to an operator, one has to know the processes and how they are operated. They also have to know what kinds of problems exist in the operator's work. But for the technical personnel it is enough to explain the control system in detail without taking into consideration the customer's process or the operators' viewpoint. When discussing sales arguments the salespeople stated that they have not received any guidelines from R&D about what should be emphasized in the products. Also in training the employees would like to get more input from R&D on how the new features should be introduced to customers and users.

The sales arguments used about the control system include quick recovery from fault situations, tools for detecting these faults, good user interfaces, good integration possibilities with other systems and new technical features. One of the important things in a control room is the ability to track faults and quickly react to them. This is why the tools for detecting faults are essential in the control system. It was also seen that the user interface can be used by the supplier company to differentiate themselves from competition. Since there are no limits in designing a user interface, it would be possible to create so called wow-factors which could be used to get the potential customers interested, especially in automation trade fairs where there are several other control systems on display at the same time. However, it was also stated that references are more effective than any sales arguments in the sales negotiations process.

A fundamental problem was found in the company's history when discussing how UX is highlighted in sales situations. There is a long tradition of offering hardware or Input/Output -cards when the focus should be on customer value. But it was seen as a time-consuming process to change this kind of orientation, which requires a lot of training and possibly even a change of generation. It was also seen important for salespeople to know what the targets are for developing products and what the story is behind new features. It is hard to argue for good UX without understanding what has been done in order to achieve it.

The people working in R&D felt that they are responsible if the user experience targets are not clear for people inside their company. If the message is not clear for their colleagues then it is not possible to transfer the UX knowledge to customers either.

> *"But it is in a certain way our mistake because the reality is that these things are done for a certain group of people. And the sales arguments should be put into words that fit in the salespeople's mouths. It's not like we develop arguments here in R&D and then complain that 'well, they didn't take it into use'. It's our mistake and our responsibility to see it through. But we don't always succeed in this." (C:I5:R&D)*

When asked about the company's competitive advantages, the user interface and technical features of the control system were seen as something that competitors do not yet have at the same level. The system is perceived as reliable and it has the capability to solve problems in the production processes. The knowledge of different industries and their needs, as well as the ability to build a whole factory with automation, were noted as benefits from several interviewees. Global status was also seen as a benefit although the company was stated to be relatively small compared to competitors. It was said that the company is big enough to be taken seriously but not so big that it would be arrogant like some competitors. The company also has a reputation for getting the automation up and running in the given time.

According to the interviewees, UX could be a competitive advantage if other aspects such as price, technical features and quality are on the same level. Disseminating positive feedback from current users to potential customers was still seen as a new way to compete with other technology suppliers. However, not all interviewees were convinced that mixing feelings with technical aspects would be something that customers would buy. It was also said that good UX is expected from the supplier's products and that all suppliers strive to create a good experience for their customers and users. It is much more likely to lose a deal by designing a bad UX than to win the deal by providing good UX.

In summary, it was perceived difficult to reach the users when introducing a new system to customers. The best and most effective way was to visit the customers' premises and see how the users work and how the systems affect their work. References were seen as one of the most important aspects in selling the system. With good references it is possible to reliably indicate the benefits of a control system in a real-life setting. Most customer relationships are long-term which reduces the need to do actual sales work and use sales arguments. It was even stated that salespeople have not received guidelines on how the system should be presented to potential customers and what UX-related aspects should be highlighted. As in the previous cases, the co-operation between different functions should be increased in order to get the most input for development and sales processes.

4.3.3 Reliability and local maintenance service as a key investment decision criteria

Investment decision criteria from the supplier's viewpoint

According to interviewees from sales, the people involved in the investment decisions are usually chiefs of maintenance, experts in automation, project managers, production managers, purchasers and/or operators. Based on the interviews there was no clear consensus on what the customers' investment criteria are and why they have purchased company C's solutions. From the training's point of view, the user interface is the main selling aspect since it makes the customer's process more efficient and it is something that everyone understands. However, the salespeople noted that especially management is not interested in the user interface; the references, industry know-how, system reliability and providing local service were seen as more important in decision-making. Price is also crucial: all suppliers need to be on the same level considering the technical details as the final decision is often made based on the price.

The user interface and how the system works is the most important thing for operators. A common experience was that users are able to influence the investment decision. One of the interviewed salespeople even stated that the operators get exactly the system that they want. The operators are like gatekeepers and their acceptance of the system is essential. The people responsible for financing only determine the price range the system must fit into.

> *"It's kind of like when a child goes to buy a cell phone with their mom, the price is what matters for the parent. And if there are two products with the same price, then the child makes the decision whether to buy an iPhone or Nokia. And this is the same story." (C:I6:S&M)*

The operators are also included in visits to reference places and they might even select someone from their group to be a part of the purchasing team. This person then participates in the negotiations meetings and takes part in decision-making. During the negotiations there are often training people involved from the supplier's side who introduce the demo to the operators. According to training, this phase should not be left to the later stages because there are so many features that require time to adopt.

When asked about the customer benefits of the system, the first and essential benefit is the automation of a process. This needs to be done in a reliable way and so that the automation integrates with the work done and also with already existing programs. The automation benefit is that the customer company can get better and more consistent quality. This is done by being able to do more precise adjustments in the process which allows for less variation in the products. When there are fewer faults, the whole process becomes more efficient. Another benefit includes the possibility to quickly react to disturbances in the process. Although other employees in the customer company might consider the operator's job in control room as passive, it is important to be able to act quickly if there are defects once a week or even once a month.

Investment decision – customer company C1

Customer company C1 bought their first automation system from supplier company C in the 1980s. Since then there have been some updates and additions/changes to the system, but the company had not thought of buying a new system from a competitor. However, now there was another production line being built in the factory and there was a need for new machinery with automation included. The interviewees felt that company C was the strongest contestant when selecting the automation supplier for the new production line. One of the reasons for this was a strict timetable for starting the production; since they did not have a lot of time it was safer to choose a supplier that is well-known for getting the automation up and running in a given time. Although company C is not the cheapest option it seemed more risky to select a supplier that the company is not familiar with. In a way, the interviewees were pleased that this particular supplier was chosen decades ago and proven to be worth the investment. Because of this it is not necessary to justify the selection of a more expensive system compared to competitors.

The interviewees could not recall why the system was acquired from this particular supplier in the first place since they did not participate in the investment decision made over twenty years ago. According to them, good references might have been one reason for selecting company C. It was also considered an obvious decision to continue doing business with them when needing an updated version of the system. Company C's know-how and the credibility and expertise of their salesperson were considered as reasons for staying with the supplier. One of the most important reasons was the fact that the supplier has not failed the company on a technical level. There have been very few problems and the recovery from them has always been quick. In addition, all introductions of new technology have been executed flexibly according to the customer's schedule without having to make many adjustments afterwards.

One reason for having successful introductions to new technology is that the customer has a virtual machine with which the programs have been tested. This way, there is limited downtime while alterations are made. This is due to the fact that the customer company handles the matter in such a way that their production does not experience long downtimes. Because of this, spare parts should be available at all times so the production can keep running. Their current contract with the supplier states that spare-part supply should not take more than six hours. However, even this can be too long if something major happens.

One thing that the customer is pleased with is that all the new versions of the system are compatible with older ones. They have never seen another system with the same compatibility or logic compared to company C's operation system. In addition, there have never been any major problems when using the system. When there have been some alterations, a person from the supplier company has been working at the plant daily to ensure that everything will work as planned. When training the operators on the new technology, usually someone from the supplier company trains

one key person from the customer company. This operator is then in charge of spreading this new knowledge and teaching others at the factory on how the technology works.

The customer company is mainly in contact with one particular person from the supplier company who is in charge of programming the system as well. They see this as an advantage since they always know who to contact in all situations. There is also no need to explain the company's situation or needs from the beginning to another person, and they can continue from where they left things the last time. Because most of customer company C1's factories have an automation system from the same supplier, they are able to confer with each other and the supplier's representatives in problem situations. Having good references in the company's other factories confirms the perception that the supplier has know-how and ready solutions that can be utilized in company C1's business.

The customer company has a long-range plan with the supplier regarding how the system should be developed at the customer's production plant in the future. This includes changes in application software, evaluating the system's state and analyzing system logs. This plan is reviewed once a year. Smaller changes that are not included in the plan — for instance, changes in the process graphics — are usually initiated by the operators. All alterations are reviewed with the customer and users so that even changes in user interface icons are already informed in advance. It was considered more beneficial to do minor changes in a shorter timespan than to wait too long and then have to deal with major changes with possible difficulties. The interviewees felt that the supplier has always been fair towards them when making the long-range plan. This kind of plan with the supplier was seen as positive since it brings transparency into the investments. This way there are no surprises considering how the automation system should be developed and the cost of it.

> *"They have always had a good eye for what we need and have never recommended anything unnecessary for us. That has been one of their strengths. They have said that they have this kind of feature, but it might not serve us at the moment so it's not worth taking into use at this point. Their game has always been quite fair in that sense." (C1:I2)*

During this relationship with the supplier, the customer has been to other factories and the supplier's premises for meetings but they have not seen how the system is used elsewhere. This was considered beneficial and there was a desire to arrange visits to reference places in the future as well. For a few years the supplier has arranged meetings where they have introduced new products to their customers. These meetings have been considered as a good effort but the customer would still want to learn more about the actual features and how they work in a real factory location. This would help in figuring out which features would benefit the customer. They would also like to see comparisons with the old and new systems so that it would be easier to evaluate the concrete benefits of these changes. Otherwise, the customer has been pleased with how active the supplier has been towards them.

When asked about why this system is beneficial from a maintenance viewpoint, the most important thing was that the system works and is compatible with the newer versions. Both interviewees were certain that selecting company C as a supplier has been a good decision and they felt that no one in the company would choose another system if there was a chance to do so. This was based on the supplier's and system reliability, ease of doing business, quick problem solving capability and system maintainability. Reliability was seen as one of the supplier's biggest competitive advantages since it reduces the risk for the customer when they know that they can rely on the people and technology provided by the supplier.

Discussing the actual investment decisions and the operators' involvement in them, it was stated that their opinion is taken into account considering, for example, how process graphics are defined in the system and what kind of information is required from the system. However, the situation in this particular case was quite different since the company had bought their first system years ago and had not contemplated buying a system from another supplier. This means that the operators have only been able to influence what is being displayed on the user interface rather than selecting a whole system.

UX was perceived as a competitive advantage but only in the case where a production plant is being built from the very beginning and all suppliers are selected by tendering. However, it was not perceived that important in factories that are already running. It was also stated that when the people involved in decision-making are technically oriented, then UX might not be the most important criteria.

> *"But in a situation where we're building something completely new, then it [UX] should be pretty important. With these hypotheses that the technique is equivalent based on its reliability, price and maintainability, then it should be one of the most important criteria, or even the most important." (C1:I2)*

When discussing what would be a good experience from the operators' point of view, it was stated that everything that the operator needs should be displayed on the system monitor. Also, all false alarms should be eliminated so that unnecessary stress would be reduced to a minimum for the operators. It was noted that the supplier has advanced in these areas considering the visual appearance of the user interface and ergonomics. However, the interviewees did not recall that UX was emphasized in any discussions between the participants. Only the colors and graphics and how they match together were mentioned.

Investment decision – Customer company C2

Customer company C2 bought their first control system from company C in 2012. Compared to the previous case where the system was used in controlling production, in this case it was used for controlling the engine room of a watercraft. In the first stage of the investment decision a makers-list was conducted with an engineering office that was in charge of concept planning and collecting data of different supplier options. Company C was already on the first list of suppliers from which tenders were invited. The company did not have experience with C's automation systems beforehand, but was familiar with a similar system of another supplier. A special requirement for the system was that it would measure and record the watercraft's fuel consumption and that it would not be necessary to increase the number of operators working on the watercraft.

The first contact with supplier company C was when they were invited to tender. At that time, the technical inspector, the technical manager and the chief engineer were present when the system was introduced. During this meeting the salesperson from company C presented slideshows about the company and displayed views of the system. However, a demo was not shown at that point. After this the supplier company continued their negotiations with another party in charge of building the watercraft. The final supplier selection was done by this other party and company C2 only confirmed the selection.

Company C2 would have wanted to participate more in the negotiations with the supplier in order to ensure that the system would have all the features that they needed. Sometimes they felt that the other party either withheld information from them or even prevented them from being in straight contact with the supplier. During negotiations, if company C2 wanted to get more information from the supplier they had to pass all enquiries through the other party. The communication situation did not substantially improve even after the supplier was selected.

During these negotiations, company C2 did not go to a reference place to see how the system works. Neither did people from the supplier company see other watercraft or try to study their working environment. However, the customer company felt that the supplier understood their needs although they were not able to be in straight contact. It was still seen as beneficial for both the buyer and the supplier to take potential customers to existing reference places.

> *"Of course when we are starting to make our decision, it would be beneficial even from the suppliers' point of view if they can show a functioning system somewhere. And there can even be an enthusiastic user who is complimenting the system and showing what it can do." (C2:I1)*

The reasons company C2 approved the supplier were that their salesperson confirmed that the system corresponds to their needs, is safe to use and environmentally friendly, and the supplier was domestic. As investment criteria, it was important for C2 that the supplier could offer local

maintenance and spare-part supply. Although the supplier was new to the marine industry, they had a lot of good references otherwise and were able to provide more flexible service than competitors considering alterations and additions to the system after the delivery. UX was not brought out as criteria for the investment decision, and according to the interviewees it was not highlighted by the salesperson either. The discussions focused more on the technical details of the system. It was argued that although the sales person had read the target audience well in the negotiations, it would have been beneficial to introduce the system from the users' point of view as well.

> *"The salesperson understood the target audience correctly and at which level the system should be discussed. But it would have been beneficial for the target audience to lower themselves to the users' level. And the salesperson could have then introduced the system, particularly from the users' perspective." (C2:I1)*

Only the chief engineer was involved in selecting and accepting the purchased system. Other system operators were not consulted during the process and the system was introduced to them only after the supplier was selected and the models for the watercraft were already built. Thus, the first introduction was done with the actual system which was built for the customer company. It was argued that it would be beneficial to have the actual users participate in the selection of a control system since they are the ones who know the operational environment. However, the users' previous experiences can affect their opinions, which is why the management should be in charge of the final decision.

> *"One should not underestimate the user at all since they might be dealing with the system every working day for twenty years. This is why the operator should be able to influence the decision on what kind of system will be acquired. But then it depends on the operator and what kind of experiences they have with other systems and which systems they have experienced to be good, reliable and suitable. So of course the technical management makes the decision on principle because there are other things that affect the decision, such as trade relations." (C2:I1)*

The operators did not have former experience with the supplier's control systems. According to one of the interviewees, the purchased system seemed a bit inflexible compared to competitors' systems and it had some functional deficiencies. The problem was that the process graphics were designed before any of the operators could influence the decisions. The supplier's maintenance people were however able to fix most of these problems afterwards. For example, some of the drawings of the control process were inaccurate, which lead to close calls with serious environmental damages. According to the interviewee, the only way to prevent these situations would be to include a person who represents the operators in the design process. This way it could be ensured that the process graphics are informative enough, that they resemble the actual process and machines accurately enough and that the phases and components are named so that everything in the process can be identified.

After the watercraft was taken into use in early 2013, the chief engineer who participated in accepting the system worked there for a few months. The operators were offered a formal training, but at that time they had already learned most of the details by themselves. However, there was a desire for more structured training considering the more difficult and novel features. It was also noted that the operators could get much more out of the system if they knew a little bit more than just the basic functions.

The system was regarded as simple, easy to use and learn, informative and clear from the users' viewpoint. These were also reasons for why an extensive training of the basic functions was not perceived necessary. The history data recording was beneficial as it allows the users to replay past events and learn from these experiences. At this point it was too early to say what benefits could be gained from the customer company's point of view. The interviewees stated that they would recommend the system to other potential customers and would also choose the same system if they had to buy another one. Compared to competitors with the most advanced systems, there were no substantial differences in how the system functions. Thus, it was hard to specify why this particular system would be better than others.

Comparing the views of the supplier and customer companies

In summary, one of the main reasons for choosing Company C as a technology supplier was the reliability of their products and services. Providing local service was also considered important since the control system has to function at all times. In addition, the credibility and know-how of the salespeople was considered a positive aspect in decision-making. The benefits of the automation include the decrease in faults and the possibility to quickly react to disturbances in the process. From the customers' point of view, the system was considered simple, easy to use and learn, informative and clear. According to the supplier, users are often involved in the technology investment decision. As a proof of this, Company C2 was the only one of all cases where an actual user was involved in the decision-making.

When company B's R&D department were asked in a survey why their potential customers would want to buy their products instead of competitors', reliability, functionality, compatibility and integration ability were emphasized. These results were based on thirteen survey responses illustrated in Table 26. A summary is also presented in Table 27 of the investment criteria based on four customer interviews. The criteria somewhat varied since company C1 had been a customer for decades and C2 was a new customer. However, product and supplier reliability and supplier expertise were mentioned in both cases.

Table 26 *Reasons for why customers would buy a control system from company C from R&D's point of view.*

Category	Description / quote
Compatibility / Integration	The system's long life-cycle and compatibility with previous product generations.
	The system can be updated and maintained for a long time since the old parts are usually compatible with the newer ones.
	Could compatibility backwards and integration to existing systems, if the customer has our previous systems.
	The integration of different functionalities into one and the same system.
Flexibility / Customization	The supplier is willing to develop the system according to customers' wishes in to some extent (concerning big clients).
	Possibility to make tailor-made solutions for customers, which means the possibility to get added features into the product.
	Because it can be made into an system that the customer wants.
Functionality	Steady functionality.
	Extensive functionality.
	There are good applications offered for the system and in that way we provide skilful service for controlling the customers' processes.
	The system provides verstile and high-quality functions for the customers' needs.
	Good user interface.
	Functioning concept for control rooms and user interfaces.
References	A long-lived system that has plenty of references.
	Ok references.
Reliability	Reliable.
	Reliable system.
	Reliable supplier.
	Reliable supplier that takes care of development in the long run.
	Reliable and respected supplier.
	Delivery reliability, which comes from our excellent customer project ability.
Service	Extensive domestic service network.
	A service organization near the customer (worldwide).
	Problems get solved (service).

Table 27 *Summary of customer companies' technology investment criteria (Case C).*

Category	Description / quote
Best in market	I have never seen another system that has full compatibility to previous models. Compared to competitors, their logics are from a totally different world.
Domestic supplier	Domesticity has some weigh to it. In the end, the competitor is an American company.
Flexibility in technology introduction	All technology introductions have been flexible and we have had to do very little repair work afterwards.
	Flexibility, changes and additions after technology introductions.
Good previous experiences in doing business	All previous experiences have resulted in that it has been quite an obvious choice to continue business with company C when having to update the system.
	I cannot remember any difficult or "catastrophic" situation as a results of their systems of what they have done.
Local after-sales service	Fast after-sales service near us.
	Local after-sales service.
Problem-solving ability of the supplier	If we have ever needed help from company C, they have reacted very quickly.
	The speed and ability to solve problems.
Product reliability	Technical reliability.
	One of the most important things is that they have not left us in trouble many times on a technical level. We get very little amount of disturbances and we have recovered from them very well.
References	They have had good references from power and paper plants, which has probably enabled the courage to try their system.
Supplier expertise	They have a really skilfull personnel.
	Company C is a very good and professional partner.
Supplier reliability	Their sales personnel has always been believable and skilled.
	All updates that have been done on the system have executed as promised.
	Company C has always had a good eye for what we need and have never recommended anything unnecessary for us. That has been one of their strengths.
	Reliability through know-how.
Other	Compatibility with previous systems.
	Easy dealing with the supplier.
	Environmental freandliness and safety.
	Maintainability.
	Previous relations.
	Spare-part availability.
	Stability of the contact person.
	Technical features.

4.3.4 Differing views in importance ratings

When focusing on the importance of UX attributes in the R&D of the control system, several issues were raised (see Table 28). The most important aspects of the system were ease-of-use and controllability, followed closely by a sense of intuitiveness so users would not have to read a manual in order to use the system. The feeling of control was also seen as a very important aspect; the user is the one who controls the processes and is able to recover quickly from fault situations. In a development process there is also a focus on making the system informative for the users. This means that the system provides adequate, easily acquired information for the users. Other aspects mentioned as a response to the open-ended question were that the system should be easy to learn, reliable and have suitable and adequate functions. In addition, the system should support achieving the users' goals and be efficient and attractive.

There was one answer that the author was unable to categorize since it described UX as a competitive factor. It also highlights why UX is important from a strategic perspective.

> *"Primarily the user experience should be so that when our customers use and test the systems of three of our competitors, they will choose us over them. Our UX should thus be competitive. Not only do we have to convince our users, but we also need to stand out in a positive way from our competitors. For a good UX, one has to understand the work and be able to improve the work, organization and results with the system. We have to make the tools so that the customer becomes 'loyal to the brand'. The technical and functional know-how is not enough; we need to produce factors which strengthen the product brand, product identity, quality and design. The basic things need to be in order, including ergonomics, usability, functionality, consistency, design and quality. But in the end, the totality is what matters, which is why the UX aspects has to support the totality and make it competitive or even incomparable against others."*

Table 28 *Drivers of a good UX from the viewpoint of R&D (13/17 respondents).*

UX Driver	Citation
Controllable	The user interface supports the control of process disturbances.
	The user has a feeling of control.
	The user has a good feeling that everything is working and they are in control of the process/system and not the other way around.
	The user controls the process and solves possible problems in the process easily and quickly.
	The whole system has to provide the user a sense of control both in normal conditions and fault situations.
Easy to learn	The user interface is easy to learn.
	The user interface has a good response time.
	Easy to adapt to, when using for the first time.
Easy to use	It is easy to use the system.
	The user interface is easy to navigate.
	When the work progresses and the use of the system does not require thinking, the user can focus on the work itself.
	Intuitive and clear to use without having to rely on documentation.
	Completing operations has to be natural and not require too much contemplating on what to do or how to proceed.
	The basic functions are logical, clear, unified and predictable – there is no need to read a manual.
Efficient to use	One can complete their tasks efficiently, quickly and easily.
Functional	The system provides functions which are in accordance with the users work.
	The system has an adequate set of functions, e.g. the trend-component has the characteristics that are usually needed (…a long list of components and characteristics).
Informative	It is easy to get all the information required from the system.
	The system gives clear and unambiguous feedback about the state of the system.
	The system supports the work of the user by providing the right information at the right time to support decision making.
	The system is able to combine information from different sources and to connect it with concepts in production.
Reliable	The user interface is robust.
	A hundred per cent reliable and also flexible.
	User interfaces have to be clear and reliable.
Supports goal achievement	The goals set for the users work are well achieved and the user has a clear view of what is happening.
	The system supports even the more complicated operations if needed.
Visually aesthetic	Good looking and there are no annoying characteristics in the functions.

When comparing the results of the importance of UX attributes between the supplier and customer companies, the Kruskal-Wallis test indicates that there were several attributes where the medians differed between the companies (see Table 29). These included attractive (p=0.002), controllability (p=0.003), pleasant to use (p=0.024), practical (p=0.007) and visually aesthetic (p=0.043). When comparing the results between the supplier company and the customer companies separately with the Mann-Whitney U test, the significance levels varied in the following way:

Table 29 *The significance levels for attributes with differing medians across companies.*

Attribute	Significance level (Company C1)	Significance level (Company C2)
Attractive	**0,002**	**0,011**
Controllable	0,134	**0,016**
Pleasant to use	**0,013**	1,000
Practical	**0,002**	0,750
Visually aesthetic	0,154	**0,022**

This indicates that the only attribute in which the supplier's responses differed with both customer companies was related to the attribute 'attractive'. As can be seen in Table 30, 'attractive' received the lowest ratings of importance from the users of both customer companies. The attribute 'controllable' was rated one of the most important attributes for both the supplier company C and customer company C1. This on the other hand was not rated as important by customer company C2. Although there were differences in the medians of the attribute 'visually aesthetic' it was still one of the three least important attributes for all companies.

The importance of different UX attributes according to their medians is demonstrated in Table 30 for all companies in Case C. The results for each attribute are also illustrated in Figure 13. For all companies, aspects such as reliability and safety of use were perceived as important. On the other hand, in addition to visual aestheticism, creativity and attractiveness had the lowest ratings.

Table 30 *The importance of different UX attributes in case companies (Case C).*

	Company A (N=9)				Company A1 (N=4)				Company A2 (N=5)			
Imp.	Attribute	M	x	s	Attribute	M	x	s	Attribute	M	x	s
1	Safe to use	7,0	6,75	0,707	Controllable	7,0	6,75	0,500	Reliable	7,0	6,6	0,548
2	Reliable	7,0	6,50	0,926	Easy to use	7,0	6,50	1,000	Safe to use	6,0	6,2	0,447
3	Easy to learn	7,0	6,38	0,916	Pleasant to use	6,5	6,50	0,577	Simple	6,0	6,2	0,837
4	Easy to use	6,5	6,50	0,535	Practical	6,5	6,50	0,577	Practical	6,0	6,2	0,837
5	Controllable	6,5	6,38	0,744	Reliable	6,5	6,50	0,577	Easy to learn	6,0	6,2	0,837
6	Supports goal achievement	6,5	6,38	0,744	Efficient	6,5	6,25	0,957	Safe to use	6,0	6,2	0,837
7	Clear	6,5	6,25	0,886	Safe to use	6,5	6,25	0,957	Clear	6,0	6,0	0,707
8	Efficient	6,5	6,13	0,991	Supports goal achievement	6,5	6,00	1,414	Pleasant to use	6,0	6,0	1,000
9	Predictable	6,5	6,13	1,126	Clear	6,0	6,25	0,500	Supports goal achievement	6,0	6,0	1,225
10	Professional	6,0	6,38	0,518	Ergonomic	6,0	6,00	1,155	Professional	6,0	6,0	1,225
11	Ergonomic to use	6,0	6,25	0,707	Predictable	6,0	5,75	1,258	Controllable	6,0	5,8	0,837
12	Practical	6,0	6,13	0,835	Easy to learn	5,5	5,50	1,732	Predictable	6,0	5,8	0,837
13	Simple	6,0	5,88	0,835	Simple	5,5	4,75	2,630	Efficient	6,0	5,6	1,140
14	Pleasant to use	6,0	5,88	1,126	Professional	5,0	5,00	0,816	Ergonomic	6,0	5,6	1,140
15	Visually aesthetic	5,5	5,38	1,408	Visually aesthetic	5,0	4,50	2,517	Creative	5,0	4,0	1,000
16	Attractive	4,5	5,25	1,488	Creative	5,0	4,50	2,517	Visually aesthetic	3,0	4,0	1,414
17	Creative	4,5	4,75	1,488	Attractive	5,0	4,50	3,000	Creative	3,0	3,6	1,817

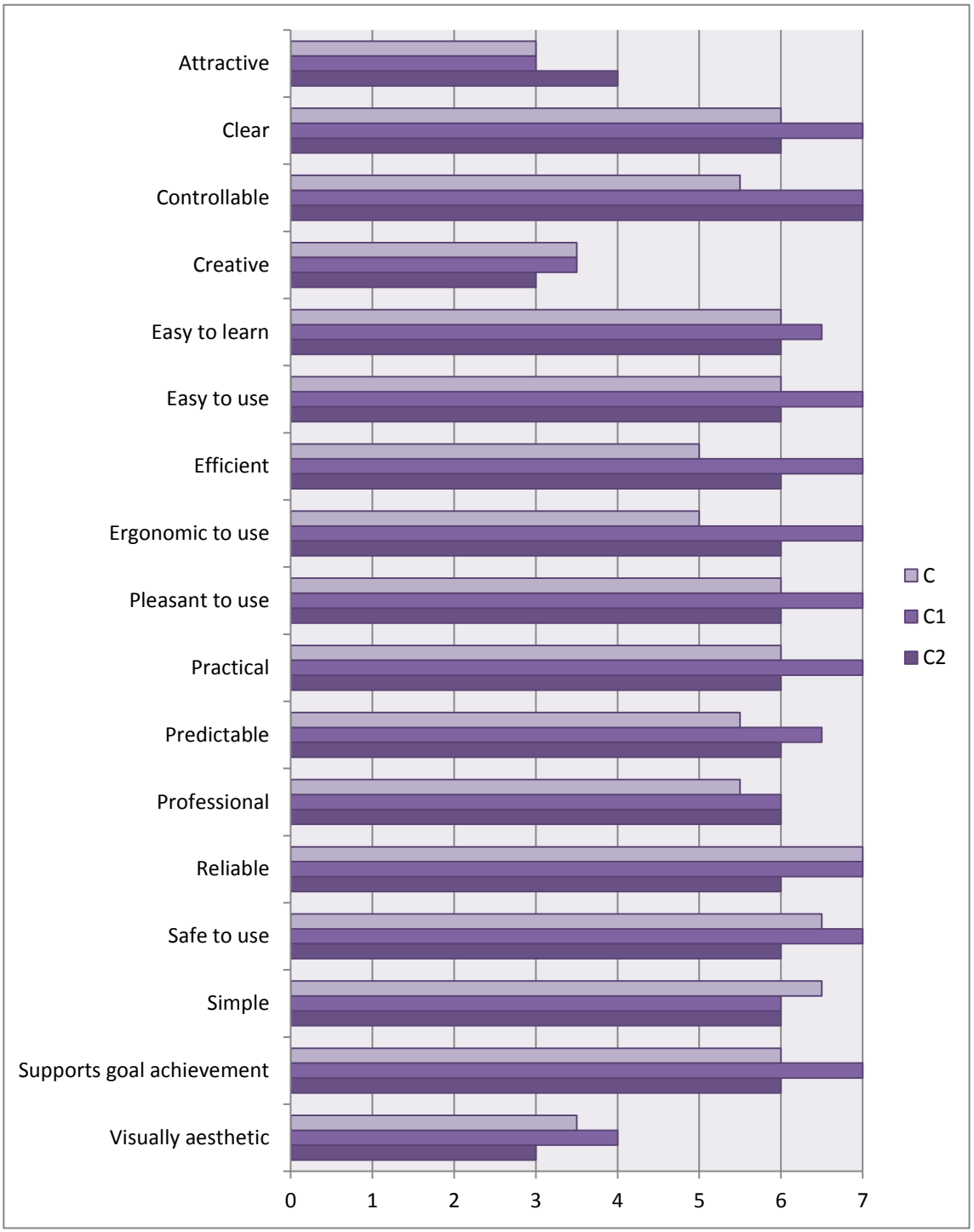


Figure 13 *The importance of UX attributes for different companies (Case C).*

5 Discussion

The main goals of this chapter are to summarize the results of the study and reflect the findings with the theoretical background of the study. In addition, new emergent topics that were not originally included in the theoretical background are discussed in light of the findings. The study aimed to understand the role of UX from several perspectives, including the suppliers' activities, customers' technology investment decisions and the users' viewpoint. This chapter is therefore divided into different subchapters to address these issues.

5.1 The role of UX in the suppliers' activities

The first research question addressed the role of user experience in the suppliers' activities, which included research and development and sales and marketing activities. The aim was to understand how UX is perceived in these different functions and how UX-related knowledge is utilized in new product development and the sales of new products. The first research question and sub-question to address these issues were formulated in the following manner at the beginning of the study:

RQ1. What is the role of UX in suppliers' functions?

RQ1a. How is UX perceived and utilized in the suppliers' NPD process

As a result, all three cases confirmed that designing better UX is an essential goal for NPD in the studied supplier companies. In addition, concentrating on UX matters was perceived as important, especially in the R&D departments. However, only in case B did the supplier company conduct UX research in order to understand how the current model should be developed further to better fit the users' needs. In case C, UX research had been conducted during the development of previous versions but not in the development of the newest system. Since conducting research and focusing the design process on the users are considered key in developing practical products for the work-

context (Gulliksen et al. 2003; Forlizzi & Battarbee, 2004; ISO 9241-210:2010), and effective user involvement is proven to yield several benefits (Kujala, 2003; 2008), the supplier companies should focus on ways to gain and utilize more information from users to find new improvement ideas. As Kujala (2008) suggests, developers should actively gather information and feedback directly from representative users and provide an informative and empowered role for the users in NPD. It should also be noted that, according to the interviews, the users' previous experiences, first impression of the new product and adequate introduction to the use of the product have a major impact on the perceived UX. If users are involved in the development process it is easier for the supplier to anticipate these factors when designing a new product.

Surprisingly, despite the vast research conducted with users in case B, results indicate the final model did not succeed as well as planned in the market. Problems emerged mainly in product usability and the use of dealers in selling the product. Although there can be good intentions in making a product easier to use, testing the usability of the pilot and final product before an actual launch also have important roles. Hyysalo (2009) states that the strengths of usability testing include: 1) identifying flaws and problems with the product concept in an early stage of development; 2) indicating how different types of users respond to the product; and 3) depicting how the product should be developed further to meet the users' needs. If faults emerge within the first use of the product, it can be difficult to alter a negative UX into a positive one and also affects the overall customer experience in a negative manner. The benefits of good UX should be communicated and demonstrated effectively so that external parties, such as dealers, will sell the product with the intended argumentation.

In each case the NPD process was mostly driven by the R&D department and the employment of different stakeholders — including sales, marketing, technical support, customers and users — was considered challenging. Especially the supplier companies' own resources were not fully employed considering e.g. salespeople, who have vast knowledge of user and customer needs. One reason for not wanting to include external parties was the concern that the sales of current models could decrease if customers had inside information of the new versions under development. However, working with other parties can help in gaining insight and ideas that would not otherwise be realized. Information held by salespeople is vital (Ernst et al. 2010), and the integration of marketing and sales with R&D is a key success factor in NPD (e.g. Gupta et al. 1986; Griffin & Hauser, 1996; Song et al. 1998). In case B the integration with R&D and marketing was already in use and was proven to provide benefits within the organization. However, the knowledge from salespeople was still underexploited in R&D in all cases.

In cases A and B, where radically new products were designed, clear targets considering UX and technical features were specified to ensure that the development process leads to a desired end-result. As Rogers et al. (2011) state, this is an important part of the design process and targets should be defined in an early stage of the project. However, in these cases, the targets were set based on different information: in case A, the people involved relied on their own knowledge of

past experiences and feedbacks, whereas in case B a co-operation was done between users and customers to understand which UX targets should be met considering the new model. One note from these results is that more effort could be put in defining goals that involve emotions and how the person should feel when using the product. In Table 31 a summary of the main results considering the NPD processes of supplier case companies is presented. The statements are based on the findings from the interviews of each case.

Table 31 *Findings on the role of UX in NPD processes in different cases.*

Statements considering the NPD process	Case A	Case B	Case C
Designing better UX is perceived important in R&D	x	x	x
Specific UX targets were defined in the beginning of the NPD process	x	x	
The NPD process was mostly R&D driven	x	x	x
Internal parties were involved in the NPD process		x	x
External parties were involved in the NPD process		x	x
UX research has been employed in NPD		x	x
R&D has systematic procedures for collecting user information from different channels			
Sales and marketing have their own channels for collecting user information	x	x	x
The usability of prototypes/ready products were tested with actual/potential users			

To conclude, UX was perceived as an important aspect for development. The supplier companies all focused on designing better experiences for their users. However, the methods for utilizing UX in NPD were not internalized yet, and other stakeholders were not actively involved in all design processes. This led to providing products with state-of-the-art features and design but which did not quite cover all the customers' expectations and requirements of customers. Because of this, more effort should be put into developing methods to employ a user-centered design approach and in testing prototypes or finished products before the market launch.

RQ1b. How is UX perceived and utilized in the suppliers' sales and marketing activities?

UX was perceived an important topic in sales and also a competitive advantage for the supplier company in all cases. It was argued that providing products that are easier and more pleasant to use from the user's point of view can lead to better productivity and better results for the whole customer company. However, it was found difficult to formulate the benefits derived from positive UX into effective value propositions for the customers, or to disseminate the positive experiences from current users to potential customers. It was also stated that it is much more likely for a supplier to lose a deal by providing a negative user experience than to win the deal by providing positive experiences.

Selden and MaxMillan (2006) and MacDonald et al. (2011) argued that the value proposition should also include the experience aspect, which is why the emotional component of experiences should be managed in the same manner as the management of product and service functionality (Berry et al. 2002). In order to do this, a reciprocal value proposition (Ballantyne et al. 2011) should be co-created with customers so that it matches what the supplier is offering and what the customers require (e.g. Flint & Mentzer, 2006; Payne et al. 2008). Taking a communication-as-process orientation (Ballantyne et al. 2011) as opposed to the traditional communication-as-transfer, the parties involved in formulating the value proposition must interact and learn together, leading to the co-creation of the 'voice of the customer' (Jaworski & Kohli, 2006).

Considering the topic of UX, the value proposition could also be used as a strategic tool in the supplier firm in order to allocate resources and direct efforts in R&D to match the customers' needs, as was suggested by e.g. Rintamäki et al. (2007). In all three cases a clear definition of what kind of value the supplier wants to provide for their customers and how to create the value could help in understanding the role of UX in the company's strategy. At this point, UX was clearly not understood in a unified manner, as some interviewees discussed only the usability or appearance of interfaces as user experience. Having a shared definition for UX and stating it in the company's strategy and value proposition would make it easier for all employees to recognize how their work relates to the provision of user and customer experiences.

In addition to difficulties in formulating the benefits from UX, there were also challenges in getting the message to end customers when selling through external channels such as OEMs and dealers. When using these channels to reach customers, the sales arguments intended by the original supplier company might not be used, thus the customer might not be fully aware of all the features or qualities of the system. Especially in international networks, company B found it hard to get their message through to dealers about what kind of sales argumentation should be used for their products. Several challenges can occur in both intra- and inter-organizational knowledge transfer (e.g. Argote et al. 2000; Riege, 2005; Easterby-Smith et al. 2008; van Wijk et al. 2008; Yang & Maxwell, 2011; Nidhra et al. 2013) including the rate of absorptive capacity, the nature of knowledge (tacitness, ambiguity, complexity) and the culture and roles in an organization.

More interactive approaches should be used in transferring UX-related knowledge so that salespeople would understand the experiential aspects of the product. For example, it was brought up in Case B by people working in R&D that the employees of the supplier company have to experience the use of the product themselves in order to relay the message to customers and users. Without a personal experience in using the product, it can be hard to explain the benefits to others. In the case of using external channels in the sales process, it would be especially important for the dealers to test the products themselves in order to understand the use of the product in more detail.

In cases A and B, people involved in the product design process also compiled lists of sales argumentation based on the benefits for users and customers. In case C, the salespeople stated that

they did not receive any guidelines from R&D considering what should be emphasized about the products. However, according to the salespeople, these intended arguments were not actively used in sales negotiations. It was argued that the conversations with customers advance quickly from the highlights to how the system actually works and what kind of technologies lie behind it. The highlights are good elements in marketing and getting customers interested but they are not what will bring a sale. Although the difficulties in selling UX are widely recognized in practice (Rhodes, 2009; Walser, 2009; Colville, 2010; Tomlin, 2010; Vaughan, 2011), the phenomenon is still new in academia (Väätäjä et al. 2014). One issue that emerged concerning this topic was that utilizing UX in sales argumentation might also require a change in the salespeople's mindset—changing the focus from selling hardware to providing customer value and understanding the value of UX for customers. For example, not all of the interviewed salespeople were convinced that mixing feelings with technical aspects would be something that customers would buy.

The value of UX should be seen in a broader perspective since creating superior customer and user experiences is regarded as an emerging enabler for differentiation (Gebauer et al. 2005; Meyer & Schwager, 2007; Verganti, 2011). A product or system that is easier to understand and use, reduces discomfort, stress and possible sick-leaves, can increase users' productivity. This on the other hand can increase the operational efficiency of the customer organization by offering cost and time savings since there is less need for training or substitutes. The value of user experience should be therefore regarded as a way to provide benefits and reduce sacrifices for the customer company. It should also be noted that the value of positive UX is accrued from previous products to new ones, demonstrating the reliability of a supplier.

Considering the use of UX in sales argumentation, it was stated in all cases that references are the most effective way of disseminating the actual UX for potential customers. Thus, it is possible to hear direct feedback from other customers and users of the product. This result coincides with the work of Jalkala and Salminen (2010) suggesting that customer references could be viewed as important marketing assets for industrial suppliers. They found that references can be used to provide indirect evidence of experience, previous performance, technological functionality and delivered customer value. In addition, Pollock and Hyysalo (2014) discuss how users can be utilized as 'reference actors' involving them in the promotion and selling processes of systems. In case A, this was found problematic since the system was so new that there were no references yet in the market. Also according to the interviews, in Cases B and C the customer companies were not taken to a see a reference place.

Demos were used in situations where it was not possible to get the customer to a reference place. It was considered important in all cases that potential customers have the possibility to test the product/system in their own environment. However, operating this kind of activity was somewhat challenging in cases A and C where the product is a control system, which is very case- and context-specific. It can be time consuming and costly to construct a demo which perfectly reflects the customers' premises and operations. Thus, the use of references and demos are highly related to

the nature and content of products. Physical products such as forklifts are easy to test before the purchase even in the customers' own premises. However, the sales of informational products such as control systems rely on reference sites as these products cannot be tested in the customers' production in a similar manner and the demos lack the informational contents from the customers' operations. The UX of informational products is also accumulated over time since the customer relationships are relatively long-term due to high switching costs.

Based on the results, several findings considering UX in sales argumentation can be presented: 1) sales arguments on UX benefits should be customized for different parties (higher management, production/warehouse manager, users); 2) a traditional list of sales arguments is not an effective sales tool unless salespeople understand the story behind the product (i.e. why the product is designed the way it is); 3) using video material from other customers could help in demonstrating the actual use and experience of the product in similar contexts; and 4) more interactive and mobile tools, such as tablet computers, could be utilized in sales negotiations. In Table 32 a summary of the main results considering the role of UX in the sales and marketing processes of supplier case companies are presented.

Table 32 *Findings on the role of UX in sales and marketing processes in different cases.*

Statements considering the sales and marketing processes	Case A	Case B	Case C
UX is perceived as a competitive advantage	x	x	x
The sales of products are organized through internal and external channels	x	x	x
A list of UX sales arguments has been provided for sales people	x	x	
UX is continuously used in sales argumentation			
It is considered challenging to demonstrate the value of user experience to customers	x	x	x
Taking customers to reference sites is considered important in demonstrating user experiences	x	x	x

To conclude, the concept of UX was not yet utilized efficiently in sales activities. Although UX was seen as a competitive advantage for the supplier companies, it was considered challenging to demonstrate the value of UX to customers and users. Because of this, UX was not continuously used in sales argumentation. However, it was important to take customers to reference sites to prove the worth of positive user experience. Suppliers should focus on providing experiences in a wider perspective, considering both user and customer experiences. As Payne et al. (2008, p. 86) emphasize, *"creating customer experiences is less about products and more about relationships which the customer has vis-à-vis the total offering".* This also involves focusing on value-in-use instead of only product features.

5.2 The role of UX in customers technology investment decisions

The second research question focused on the role of user experience in the customers' technology investment decisions. This included the identification of relevant criteria for supplier and technology selection and reflecting on how UX is perceived in the decision-making process. Also, it was of interest to examine how the actual users and their experiences are taken into account in these decisions and whether users are involved in the decision-making process. The second research question was formulated in the following manner:

RQ2. What is the role of UX in customers' technology investment decisions?

In all cases, the supplier's discussed that the actual product users are able to influence the investment decision. It was stated that although technical features of the product and economic issues such as price and lifecycle costs are considered important, it seems that users' needs and experiences are starting to be a priority as well in the investment decision. In Case C it was emphasized that often the people responsible determine a price range for the investment and users get to choose which product they want to use in their work. Often the size of the company and investment determine the departments and individuals that are involved in decision-making.

The users' experience becomes apparent in decision-making especially if the customer is able to test the product beforehand. For example, in Case B it was possible to manage demos and truck test drives so that users have the opportunity to compare different products before the purchase. In a study made by supplier company B, in 65 per cent of customer cases the users get to decide which truck they want to use. However, involving users in the actual investment decision was found challenging in the customer companies since their former experiences have a vast impact on how they rate a new product. As Forlizzi and Battarbee (2004) argued, users' expectations influence how a product is used and experienced. Expectations can be derived from e.g. previous use situations with similar products, the perceived brand image of the company and the person's skills in using interactive products. Also, if a product or system is used for only a few hours it will probably not feel as easy to use as the work tool that has been used for decades.

Within the customer companies, only in C2 did one of the users have a significant role in the technology investment decision. In other cases the users were not involved in decision-making nor did they have a chance to test the product/system beforehand. However, the interviewees in customer companies questioned whether they should have consulted the users more when selecting a supplier. Consulting users was claimed to be a common procedure since the users have the most knowledge of the work requirements and the operational environment.

In some cases it was not possible to go to a reference place since there were no previous deliveries for the new products. However, as was previously observed, references were the most effective way for disseminating the actual UX for potential customers. Therefore, UX knowledge can be ef-

fectively communicated by word-of-mouth (WOM). Kim (2014) suggests that WOM information plays an important role in both B2C (Katz and Lazarsfeld, 1955; Murray, 1991; Gremler, 1994; Nam et al., 2010; Cheung and Thadani, 2012; Yang et al., 2012) and B2B transactions (Moriarty and Spekman, 1984; Roth et al., 2004). However, WOM in B2B transactions has received less attention as it is an informal process. Jalkala and Salminen (2010) refer to WOM as a phenomenon largely beyond the control of markets, whereas customer reference marketing relates to activities initiated by the supplier in a more structured way of. WOM and customer reference marketing utilization from the supplier's perspective in order to disseminate UX-related knowledge to affect the investment decision still needs more research focus.

The criteria mentioned for the technology investment decision of a specific product in each customer company are presented in Table 33. This shows that the most important criteria were that: 1) the product is best in the market compared to competition, and was often stated to be superior in technical details; 2) the product has all the technical features that the customer company requires; and 3) the supplier company is perceived as a reliable business companion. What is probably more surprising than this result is that price, product reliability and references were mentioned as criteria in only half of the cases. When it comes to UX, the only specific UX-related criterion was 'ease of use'. However, UX seems to have an indirect and implicit impact on decision making, as good experiences with previous models and in doing business were considered important as well as product and supplier reliability. This implies that although the UX of a specific product is not considered the most important investment decision criteria, previous positive experiences still affect decision making.

Regardless of these results, it was found important that the customer companies buy work tools that their employees will use and that will not result in negative consequences. It was argued that the customers would not intentionally buy products that are not good to use. This implies that although UX was not emphasized in the investment decision criteria, it still has an indirect impact on which supplier is chosen. For example, providing positive UX has an effect on the supplier's reputation. Thus, the assessment of UX value is not specific for a given product at the moment of purchase, but is considered a part of the overall CX. It should also be considered that especially the hedonic qualities of an offering are appreciated but often neglected in purchasing decision justifications (Diefenbach, 2011; Abramov, 2012; Ollberg, 2013). The sellers stated that positive UX will probably not be the criteria for choosing a specific product, but a negative UX will result in choosing another product instead.

It could also be noted that the total customer experience has an effect on the investment decisions. As Sward (2007) states, several aspects influence the total experience, including staff interaction, brand awareness, error-free installation, integration with other solutions, product use, training, support, problem resolution and maintenance. In this manner, the results suggest that suppliers should concentrate on providing superior customer experience and not only focus on developing the UX, which was also suggested in the literature (Gebauer et al. 2005; Meyer & Schwager, 2007; Ver-

ganti, 2011). Even though a supplier's product is technically more advanced than competitors, they might not get the sale if the customer does not get along with the people working for the supplier company. Figure Figure 14 illustrates how UX and CX cumulate over time in a B2B relationship.

Table 33 *Criteria for technology investment decisions mentioned in the customer interviews.*

		Company					
Category	Criteria	A1	A2	B1	B2	C1	C2
Product	Best in market	x	x	x	x	x	
	Technical features	x	x	x	x		x
	Price	x		x	x		
	Product reliability			x	x	x	
	Good experiences with previous products		x	x			
	Product compatibility	x				x	
	Ease of use				x		
	Environmental safety						x
	Life cycle costs			x			
	Product integration		x				
	Product maintainability					x	
Supplier	Supplier reliability	x		x	x	x	
	References	x	x			x	
	Brand			x	x		
	Domestic supplier						x
	Problem-solving ability of the supplier					x	
	Supplier expertise					x	
	Supplier stability	x					
Relationship	Easy dealings with supplier					x	
	Good experiences in doing business			x		x	
	Previous relations					x	
	Stability of the contact person					x	
Service	Local after-sales service	x				x	x
	Flexibility in technology introduction					x	x
	Warranty	x		x			
	Service contract terms and conditions			x			
	Spare-part availability						x
	Time of delivery	x					

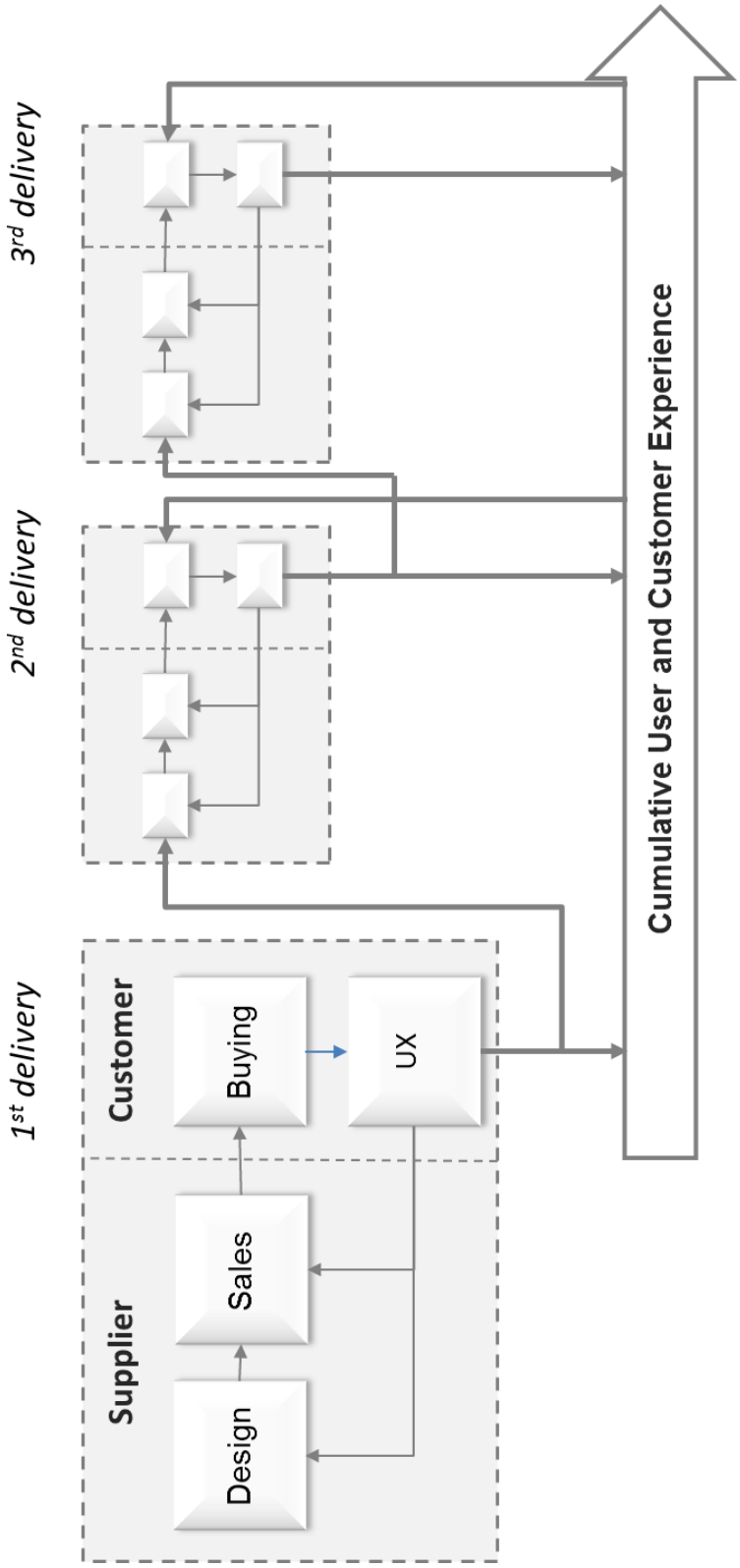


Figure 14 *Cumulation of UX and CX in a B2B relationship.*

In Figure 14 UX and CX are depicted as experiences that cumulate over time as a result of several deliveries from the same supplier. In an ideal situation designing a new product would start at UX research by trying to understand how the current product in the market could be developed further to better meet the needs of users and customers. Although R&D can have a good understanding of UX from previous customer deliveries, feedback should be gained from actual users as well. UX should also affect how the product is sold to new customers. The positive feedback from users should be utilized and emphasized in selling new products. As a result of this UX would be also better noted by the people involved in making the investment decisions and perhaps even identified as important criteria for purchasing.

As the supplier and customer go through this process of selling, buying and delivering and accepting new products, the customer company gains experience from using the product and doing business with the supplier. This experience should be utilized by the supplier company in developing the next model. The accumulated UX and CX also affect the next investment decision when the customer is looking for an update or replacing old products. Suppliers should bare this in mind when identifying and handling all customer touch points in order to create superior CX.

To conclude, it was argued that the product users can influence the investment decision, although only one of the customer companies involved a user in decision-making. UX was not one of the main criteria mentioned; the products' superiority and technical details, as well as the supplier company's reliability, were considered the most important aspects when choosing a supplier. However, the findings from the interviews suggest that UX still has an important indirect impact on supplier selection. Especially if a customer company has positive experience using previous models, this can affect the investment decision. Thus, UX can be considered as an element of overall customer value, mainly derived from past experience and supplier reputation, but not considered as an explicit and differentiated point with regard to new product offerings. This implies that UX value is realized with a time-lag for the supplier company. Supplier companies should focus on the total customer experience which is a wider concept than UX, since CX also has an impact on whether the customer is willing to pursue a business relationship with the supplier.

5.3 The importance of UX-related factors for R&D and users

The third research question focused on perceptions of UX between actual users in the customer company and the R&D department of the supplier company. The interest here was to investigate what aspects related to user experience are essentially the most important from the users' perspective. Additionally, the interest was to find out whether R&D finds the same UX-related factors important as well. The third research question can be formulated as following:

RQ3. What UX-related factors are perceived important in the NPD process and usage of specific products?

When comparing the results of the quantitative survey within cases, it can be noted that the importance of different UX-related factors are quite similar between the R&D personnel and the users. In case A, aspects such as reliability, ease-of-use and safety of use were considered important for both R&D and users (see Table 34). On the other hand, it was not found as important that the system would be creative, visually aesthetic, simple or attractive. In tables 34, 35 and 36, M is the median, x is the mean and s is the standard deviation for the attributes.

Table 34 *The five most and five least important UX-related factors between R&D and users (Case A).*

	Company A (N=9)				Company A1 (N=4) + A2 (N=5)			
	Attribute	M	*x*	s	Attribute	M	x	s
Most important	Reliable	7,0	6,78	0,441	Safe to use	7,0	6,67	0,707
	Easy to use	7,0	6,33	1,000	Efficient	7,0	6,56	1,014
	Safe to use	7,0	6,33	0,866	Reliable	7,0	6,56	1,014
	Controllable	7,0	6,22	1,093	Easy to use	7,0	6,22	1,093
	Clear	6,0	6,44	0,527	Easy to learn	7,0	6,11	1,167
Least important	Predictable	5,0	5,33	1,323	Simple	6,0	5,67	0,866
	Attractive	5,0	5,11	1,167	Supports goal achievement	6,0	5,56	1,130
	Visually aesthetic	5,0	5,11	1,054	Creative	5,0	4,67	1,581
	Simple	5,0	4,56	1,878	Attractive	5,0	4,22	1,922
	Creative	4,0	3,78	1,563	Visually aesthetic	5,0	4,22	1,922

In case B, both R&D and users found it important that the trucks would be efficient and pleasant to use (see Table 35). As the top five most important attributes do not coincide with other aspects, it should be noted that the Mann-Whitney U test indicates that the distribution of different UX attributes did not differ from each other in a statistically significant manner. Also, the first ten attributes received a median and mean of at least six (6) in all companies, so the differences between the attributes' importance are quite small. On the other hand, the least important were mostly the same

as in case A; it is not considered that important that the trucks are creative, visually aesthetic or simple.

Table 35 *The five most and five least important UX-related factors between R&D and users (Case B).*

	Company B (N=8)				Company B1 (N=4) + Company B2 (N=5)			
	Attribute	M	*x*	s	Attribute	M	x	s
Most important	Efficient	7,0	6,75	0,707	Controllable	7,0	6,56	0,726
	Reliable	7,0	6,50	0,926	Efficient	7,0	6,33	1,000
	Safe to use	7,0	6,38	0,916	Pleasant to use	6,0	6,33	0,500
	Pleasant to use	6,5	6,50	0,535	Easy to use	6,0	6,33	0,707
	Easy to learn	6,5	6,38	0,744	Ergonomic to use	6,0	6,33	0,707
Least important	Practical	6,0	5,88	0,835	Simple	5,0	5,44	0,882
	Predictable	6,0	5,88	1,126	Predictable	5,0	5,22	1,787
	Simple	5,5	5,38	1,408	Attractive	5,0	4,33	1,803
	Visually aesthetic	4,5	5,25	1,488	Creative	5,0	4,00	2,062
	Creative	4,5	4,75	1,488	Visually aesthetic	3,0	4,22	2,108

In case C, the reliability, safety of use and ease-of-use were some of the most important aspects of a control system (see Table 36). These results are quite similar compared to case A, where the evaluated product was also a control system. In addition, the least important attributes were similar to both previous cases; the creativity, attractiveness, visual aesthetics and simplicity are not considered that important aspects of the control system.

Table 36 *The five most and five least important UX-related factors between R&D and users (Case C).*

	Company C (N=16)				Company C1 (N=6) + Company C2 (N=4)			
	Attribute	M	*x*	s	Attribute	M	x	s
Most important	Safe to use	7,0	6,94	0,250	Reliable	7,0	6,70	0,949
	Reliable	7,0	6,88	0,342	Practical	7,0	6,60	0,699
	Easy to learn	7,0	6,63	0,500	Easy to use	7,0	6,60	0,843
	Easy to use	7,0	6,63	0,500	Safe to use	7,0	6,50	0,972
	Controllable	7,0	6,56	0,512	Pleasant to use	7,0	6,50	0,972
Least important	Simple	6,0	5,63	0,619	Simple	6,0	5,90	1,197
	Pleasant to use	6,0	5,69	1,250	Professional	6,0	5,70	0,675
	Visually aesthetic	6,0	5,44	1,315	Visually aesthetic	4,0	3,90	1,663
	Attractive	6,0	5,31	1,250	Creative	3,5	3,40	1,174
	Creative	3,0	3,38	1,204	Attractive	3,0	3,00	1,054

When comparing the results between cases, there were apparent consistencies in the importance of UX-related attributes. The most important UX-related attributes included reliability, safety of use and ease-of-use. Efficiency, controllability and ease-of-learning were considered important as well. On the other hand, the least important attributes included creativity, visual aesthetics, simplicity and attractiveness. However, one attribute which was found in different categories for different respondents was ‘pleasant to use’; from the supplier company’s view it was one of the least important attributes and for the customer companies’ it was one of the most important attributes.

As discussed in the theoretical part of the study, the effect of hedonic and utilitarian goals on purchase decision has been studied in consumer research (e.g. Batra & Ahtola, 1990; Dhar & Wertenbroch, 2000; Okada, 2005). Hassenzahl (2007) concludes that people may focus on the pragmatics of a product (e.g. usability) and put less value on the hedonic aspects (e.g. beauty) even though the ugliness can drastically impact the later product experience. These results also suggest that in the B2B context the pragmatic goals (e.g. efficiency) are more important than the hedonic goals (e.g. visual aesthetics) in the design and use of industrial products.

To conclude, the results between the developers of specific products and users of the products are quite similar in all cases, although some differences also occurred. The results imply that the pragmatic aspects of technological products are more important than the hedonic aspects for both groups.

6 Conclusions

This chapter summarizes the main findings and contributions of the study. The study's contributions are divided into theoretical and practical implications. This chapter also includes the assessment of the research process. The qualitative part of the study is evaluated in terms of trustworthiness which includes the assessment of the credibility, transferability, dependability and confirmability of the study. The quantitative part of the study is evaluated in terms of reliability and validity. In addition, the limitations of the study are discussed as well as suggestions for further research.

6.1 Summary of the study

Although UX and customer value have been widely studied in the B2C context, the value of experiences in the B2B context has still remained relatively unexplored. The purpose of this study was to explore the role of UX in B2B relationships from the suppliers' and customers' perspective. From the suppliers' point of view, UX was studied in research and development and sales and marketing activities. In the customer companies, UX was studied as a part of technology investment decisions and related to the use of technological products. The reason for choosing these research objects was to understand the role of UX in the functions that most evidently connect the supplier and the customer in a business-to-business relationship.

In order to address this issue the topic was divided into three main research questions which were answered with the help of qualitative and quantitative means. A total of 38 interviews were conducted to explore the perceptions and role of UX in suppliers' and customers' activities. In addition, a survey was carried out to study the importance of seventeen UX-related factors in the development process of new products and the usage of predetermined products. The results suggest that although user experience was seen as an important aspect in both the suppliers' and customers' activities, some challenges occurred in utilizing UX-related knowledge. For instance, although supplier companies were focused on designing better experiences for their users, methods for utilizing

UX in new product development were not yet internalized and other stakeholders working outside of R&D were not actively involved in the design process. Although user research was conducted in some cases, the lack of usability testing led to negative experiences among the first groups of users.

The concept of UX was not yet utilized effectively in sales activities either. Although UX was considered as a competitive advantage by the sales personnel, they were not able to transfer the benefits into their sales argumentation. More interactive methods for disseminating the experiences of users to potential customers are needed. However, from the customers' point of view, UX was not considered one of the most important criteria in the process of technology investment decisions, although it can have an indirect impact on supplier selection as previous experiences and supplier reputation can be a result of positive UX. It was argued that good UX is a requisite for having a supplier on a customers' short list. Previous positive experiences considering the product and supplier can also have an effect when choosing the supplier.

The results from the survey suggest that the developers of new products mostly agree on which UX-related attributes are the most important and least important for users. Although there were some differences as well, the results still indicate that the pragmatic aspects (e.g. efficiency, reliability, ease-of-use) of technological products are more important than the hedonic aspects (e.g. creativity, attractiveness, visual aesthetics).

6.2 Contributions of the study

This chapter highlights the contributions of the study from both a theoretical and managerial point of view. As the study is one of the first attempts to bind two theoretical starting points into one, theoretical contributions can be drawn from the results. There are also suggestions for managerial practices, as the topic originated from a more practical starting point.

6.2.1 Contributions to prior research

Whereas both UX (e.g. Bargas-Avila & Hornbaek, 2011) and customer value (e.g. Lindgreen et al. 2012) have been studied extensively in the B2C context, there is little evidence of how these concepts relate to each other in the work context. This study contributes to the research streams of UX as well as customer value in the B2B context, exploring the phenomenon of UX in B2B-relationships and understanding its role in different supplier and customer activities.

Based on the literature review in the theoretical part of the study, a framework is presented in order to combine the theories of UX and customer value to illustrate the benefits of UX for different stakeholders. Although the topic seems to be of great interest in practice (e.g. Dilworth & Miller, 2011), it still has not received much attention in the academic literature. As the benefits of UX are

studied, especially in the context of designing new products and considering the use of products, there is little evidence of how UX creates value for the actual customers in the B2B context. This is still a challenging task as the causality between UX design and the technical / economic / service / social benefits for the customer are not easy to depict. However, based on the theoretical model it is possible to argue that concentrating on UX in design practices will yield benefits to all stakeholders in the B2B relationship.

Considering UX research, this study contributes especially to the research on user-centered design and value-based selling of UX. The discussions of user-centered design confirm previous findings in UX research (e.g. Kujala 2003; 2008) and suggest that both internal and external stakeholders should be involved in the design process. Both user research and usability testing are important activities to ensure that the developed product provides positive experiences for users (Hyysalo, 2009). It should also be noted that UX has also an impact on the total customer experience which was also highlighted in the findings. If the use of a product evokes negative feelings in the work domain, this can have a negative effect on how the customer company perceives the supplier's reliability and reputation.

Considering UX in sales activities, this study takes part in the discussion by exploring the challenges of using UX in sales argumentation and also provides suggestions as to what kind of methods can be used in better disseminating UX-related knowledge for prospective customers. As Väätäjä et al. (2014) argue, this is a research stream that has received little attention. However, especially because of its practical importance, more theoretical models should be built in order to understand the linkage between the benefits of UX to customers and value-based selling in the B2B context.

This study also contributes to the vast literature on customer value. Although the notion of customer value has been studied as a determining factor in purchase decisions in the B2B context (e.g. Ulaga & Chacour, 2001; Liu et al. 2005; Ahola et al. 2008; Olaru et al. 2008), this is one of the first attempts to depict whether UX has an impact on technology investment decisions and if users are involved in the supplier selection. This is an important topic as managers seek to find ways to differentiate their offerings from competitors. However, it can still be argued whether experience is not emphasized in the customers' decision criteria since no real efforts in selling UX has taken place.

Based on previous studies considering user experience measurement (Bargas-Avila & Hornbaek, 2011), this research offers a systematically constructed tool for measuring the importance of UX in different contexts. Although there exists several self-reported metrics for studying UX (Tullis & Albert, 2008), they do not include metrics for studying the importance of UX-related attributes. This is one of the first attempts to quantitatively compare the views of R&D and users considering their perceptions of UX. The measurement tool can also be used for management purposes as it is possible to measure the importance of different attributes and the performance of the suppliers' prod-

uct in terms of those same attributes. Thus, managers will be able to detect which attributes they should focus on in developing their products.

6.2.2 Contributions to managerial practices

This study is one of the first attempts to explore how UX is perceived in different contexts of B2B relationships and what kind of value UX provides in the interaction of suppliers and customers. Considering the role of UX in the NPD process, there were some activities that should be developed if the company has a desire to design better user experiences for their products. First of all, in order to design products that would better fit the needs of customers and users, these parties should be involved in the development process in a suitable manner. This might seem trivial, but it was considered to be a real challenge to include external parties in developing new products. The results suggest that a company cannot claim to have a true user-centered mindset in product development if there is no research conducted to understand the work and the context in which the product is used. Managers have a decision to make: whether to use consulting firms for the research or hiring people to concentrate on UX-issues. Both possibilities have their pros and cons, and it should be evaluated whether it is more beneficial in the long run to have that kind of knowledge inside the company. It should also be noted that in addition to user research, usability studies have an important role before launching new products. It is not suggested that every little detail should be tested, but it should be ensured that the product works the way that it is supposed to and that it does not evoke immediate negative user experiences due to technological deficiencies.

When it comes to utilizing UX-related knowledge in sales activities, managers should put effort into creating new methods to disseminate the actual experiences of users. As the results indicate, this is not an easy task, especially when the products are also sold through intermediaries. One of the key issues is involving sales employees in the development process of new products. Although challenges were discovered in these activities, there are also some initial benefits that can lead to better results in selling UX. If the salespeople are involved in the early stages of a development process they can be more committed to selling the product since they understand the story behind it, why some specific UX targets are taken into consideration and why it can benefit the company to highlight these UX aspects in sales activities. More interactive methods should be created to make it easier for salespeople to argue the value of UX. For instance, video material from the customers' premises demonstrating product use as well as the users' experiences could be used in order to bring the user's voice closer to the potential customers, especially if going to reference places is not an option. Also, the use of references in highlighting UX value should be strategically organized within sales and marketing activities.

In addition, companies' value propositions should also include the experiential aspect (Selden & MaxMillan, 2006; MacDonald et al. 2011). The value proposition could be created with customers so that it would match the targeted value of the supplier and the expected value of customers. The

proposition could also be used within companies as a strategic tool to guide the use of resources into creating better experiences for users and customers (Rintamäki et al. 2007). Besides UX, companies should also focus on creating superior value for their customers in all touch points by understanding how the customers' experience could be enhanced and standardizing the activities that take place when communicating with customers.

From the customer companies' point of view, efforts should made to utilize users in the technology investment process. As many customers argued, users are the people who have ultimate knowledge of the use of products and they have the ability to evaluate whether a product is suitable for their work conditions or not. This can be difficult in companies with several employees using the same equipment in their work. However, in all case companies in this study the amount of users were less than ten people, which makes it possible to listen to their needs without the feedback being too overwhelming. Also, users should be taken to reference places so that they can discuss the products with their colleagues in other contexts. Although UX was not perceived as one of the most important criteria in purchasing new products, the results suggest that it has an indirect impact on the selection. Therefore, suppliers should emphasize experience-related aspects in order for UX to be a more notable reason for choosing a specific supplier.

As a final suggestion, in order to create a new mindset within the company that accentuates the importance of UX, higher-level managers should be committed to being the driving force for change in the organization. Without the managers' commitment it can be challenging for people in R&D and other departments to emphasize the importance of UX in other activities. Without a strategic focus on UX it can be impossible for the company's employees to have a unified view of the UX concept or an understanding of how their actions affect the overall experience of users and customers. A change in a company's mindset also requires a change in the organizational culture, which can be a time-demanding but rewarding task.

6.3 Assessment of the study

The scientific paradigm of pragmatics was adopted in this study in order to not bind the research to be either interpretivist or positivist by nature, but to let the research questions lead the method selection. Although the study employs mostly qualitative data from interviews, surveys were also used to answer one of the research questions. Different criteria are used for the evaluation of qualitative and quantitative research. The latter is usually evaluated in terms of validity and reliability. Validity is concerned with whether a measure actually measures the concept that it represents (Carmines & Woods, 2005, p. 933) whereas reliability refers to the accuracy of the results obtained in the study and whether the same results could be obtained by repeating the study (Gummesson, 2000, p. 185). In Guba's work (1981) the criteria for evaluating quantitative research are divided into internal validity, external validity, reliability and objectivity (see Table 37).

Table 37 *Comparison of criteria by research approach (Guba, 1981).*

Criterion	Quantitative approach	Qualitative approach
Truth Value	Internal Validity	Credibility
Applicability	External Validity Generalizability	Transferability
Consistency	Reliability	Dependability
Neutrality	Objectivity	Confirmability

Due to its nature, qualitative research should be evaluated by different criteria. The concept of trustworthiness was proposed (Guba, 1981; Lincoln & Guba, 1985), which is divided in naturalistic terms into credibility, transferability, dependability and confirmability. The qualitative part of the study is evaluated by these criteria whereas the quantitative part of the study is assessed based on validity (internal and external) reliability and objectivity.

6.3.1 Evaluation of the qualitative part of the study

For the evaluation of the qualitative part of the study the criteria proposed by Lincoln and Guba (1985) are adopted to assess the trustworthiness of the study. This criterion includes the evaluation of the credibility, transferability, dependability and confirmability of the study. *Credibility* relates to establishing confidence in the 'truth' of the findings and demonstrating that a true picture of the phenomenon under scrutiny is being presented (Shenton, 2004). It is equivalent to internal validity in quantitative research. Credibility is achieved when the results are believable from the perspective of the subjects under investigation. Several actions were considered in order to ensure the credibility of the study.

First of all, Yin (1994) recognizes the importance of incorporating 'correct operational measures for the concepts being studied'. The selection of research methods was based on the paradigm of pragmatism which supports the use of mixed methods and choosing the most appropriate research methods based on the research questions (Yardley & Bishop, 2008). Before the methods were chosen, a case study research approach was selected in order to better understand the complex phenomena (Gummesson, 1993) of UX in B2B-relationships. Since there were many factors and different employee groups involved in this study with entangled interconnections between them, simple and unambiguous research designs could not be exploited in investigating them. The role of UX in the suppliers' and customers' activities was explored with qualitative in-depth interviews since they are the most common way of generating data in case study research (Gummesson, 1993).

In order to reach credibility, it is suggested that the researcher should develop an early familiarity with the culture of the participating organizations before the first data collection takes place (Shen-

ton, 2004). This was ensured by having several preliminary discussions with key people in each company in order to better understand how the companies function. The researcher was introduced to people inside each company and taken on tours to see the factories and test the products. This way it was easier to get inclusive introduction and to build relations with the people in the case companies. Lincoln and Guba (1985) as well as Erlandson (1993) recommend a prolonged engagement between the investigator and the participants in order to gain a relationship of trust between the parties. Also, appropriate documents were explored beforehand, including brochures, products' video advertisements and other sales material.

The use of triangulation is also noted as a means to gain credibility for the research (Guba, 1981; Shenton, 2004). There are at least four different ways of triangulation: 1) the use of a variety of data sources (data triangulation), 2) the use of several different researchers (investigator triangulation), 3) the use of multiple perspectives to interpret the triangulation (theory triangulation) and 4) the use of multiple methods to study a research problem (methodological triangulation). In this study, the use of a variety of data sources ensures data triangulation. Including interviews, the researcher gained internal material from the companies which have confirmed the authenticity of the topics under research. Investigator triangulation was used mainly in case B where several researchers were involved in the interviews and conducting a report for the case company based on the interview results. This method could have been used in other cases too, but it was found time-consuming to find participants who could join all interviews and also be involved in coding the results. However, there were still discussions about the interviews with others involved in the research project, which enabled the comparison of their findings and experiences of the case companies. Several theories were used in interpreting the results including user experience, customer experience and customer value. This enabled a richer discussion of the findings of the study. Methodological triangulation was only used partly in answering the third research question. Although the research question was mainly addressed with quantitative methods, the interviews and other material confirmed the importance of UX-related factors within supplier companies. However, users were not interviewed due to time restrictions in the research program. Also, observation or focus-group discussions were not utilized for the same reason.

Member checks are considered the single most important methods to validate the credibility of qualitative research (Guba, 1981; Silverman, 2007). Within this study, the case descriptions were provided for the contact persons of all case companies in order to check whether the researcher understood everything correctly and that no misleading interpretations were made based on the results. Only minor corrections were suggested based on these reviews, which indicates that the results and interpretations were accurate and agreeable.

In order to allow *transferability*, sufficient detail should be provided in the context of the fieldwork so that it can be assessed whether the findings can justifiably be applied to another setting (Shenton, 2004). In other words, if the results of the study can be transferred to a broader population or to more general theoretical propositions (Lincoln & Guba, 1985). In qualitative research this is a chal-

lenging task since, in practice, conventional generalizability is not possible as all observations are defined by the specific contexts in which they occur (Erlandson, 1993). However, the transferability depends on the thickness of the description (Dyer & Wilkins, 1991; Langley, 1999). If the illustrations and suggestions are thick and rich in nature, it is easier for others to judge the transferability of the ideas to other situations and contexts. In this study, a sufficient description is provided of the case companies and informants/participants including: 1) the number of organizations taking part in the study and their industries; 2) the number of participants involved in the fieldwork; 3) the data collection methods that were employed; 4) the number and length of the data collection sessions; and 5) the time period over which the data was collected. Although the case companies are not widely described due to an obligation to maintain secrecy, it is possible to relate findings from other industries into the ones presented in this study.

Dependability (Lincoln & Guba, 1985) relates to reliability, referring to the ability to repeat the study and ending up with the same results. It encourages to provide an audit trail (the documentation of data, methods and decisions about the research) which can be laid open to external scrutiny (Guba, 1981). Compared to quantitative research, it is found challenging to justify the repeatability of a qualitative study. Although the interviews were based on a predetermined set of questions, the discussions tend to take paths that were not predicted beforehand. Thus, the interviews are hardly ever an actual repetition of one another as the researcher has to adjust to the fact that not all interviewees have the same knowledge of different topics. In addition, although the methods of data analysis have been reported in this study, it is possible that other researchers could find different code types from the data and focus on distinct subjects. If the data coding was based on theoretical foundations, it would have increased the dependability of this research. However, as the subjects of interest were found by 'letting the data speak for itself', other deductions could also be made. Nevertheless, detailed descriptions of the empirical material, data-collection methods and analysis process including tables were provided so that the process would be transparent to readers.

Confirmability refers to the objectivity of the results and the degree to which interpretations and findings of a study can be confirmed by others (Lincoln & Guba, 1985). Considering confirmability, it should be demonstrated in the study that the findings emerge from the data and not from the researcher's own dispositions (Shenton, 2004). Because of this, steps must be taken to ensure that the work's findings are the result of the experiences and ideas of the informants rather than the characteristics and preferences of the researcher. Considering the confirmability, it can always be debated in qualitative research whether the research is biased or if the researcher has formed conclusions on a too-narrow basis. In this study, several informants were chosen from the supplier companies from different departments to ensure that the results from different interviewees confirm the results of others. Because of this it was possible to remain objective since the results were consistent for the R&D participants within a case company. In the reported findings, several quotes are used to prove that the ideas and responses have truly come from the interviewees and are not

interpretations of the researcher. In addition, a Senior Researcher who is familiar with the companies and their informants reviewed the manuscript in order to validate whether the interpretations made by the researcher were plausible. Several theoretical foundations were also reviewed to interpret the results.

6.3.2 Evaluation of the quantitative part of the study

There are several types of validity that can be used to assess a quantitative study (McDonald, 2005; Carmines & Woods, 2005; Saunders et al. 2009) including construct validity, content validity, convergent validity, criterion-related validity, internal validity and external validity. However, since the quantitative part of the study is used to measure a rather simple phenomenon (the importance of UX-related attributes) excluding, e.g. causal relationships between different theoretical concepts, the validity evaluation focuses on the degree in which the UX concept is accurately measured (internal validity) and whether the results can be generalized (external validity). In addition, the study is evaluated based on its reliability and objectivity.

Validity is the extent to which any measuring instrument measures what it purports to measure, rather than reflecting some other phenomenon (Carmines & Woods, 2005). The purpose of the quantitative study was to measure the importance of specific UX-related factors in the development of new products as well as in using the existing products. One issue that can be critiqued here is the aspect of time: while the users based their experiences and perceptions on the product they are using right now, R&D focused on evaluating the importance of specific attributes in developing the product further. Thus, it was not possible to compare what UX-attributes were considered important when designing and using the same product. In order to do this, the timeframe for the survey should have been different: the survey should have been conducted first in R&D while the product was still under development and only among users after they have used the product. However, this would only be possible with products that were still under development and not yet on the market. To find these kinds of cases would be challenging, and there would have been uncertainty considering the study's completion. Also, the time-frame for evaluating UX was not specified for the users, meaning that users had different amount of experience of using the product in question. This could have been avoided by selecting products that are in the same stage, for instance, when entering the market. It could have brought more insight if the value of UX attributes were measured with a longitudinal study; in the beginning of product use, after a few months of use and when the users are more experienced with the product. This way, all cases would have been treated in the same manner and the differences in UX value could have been depicted as experience increases.

The survey was constructed based on attributes found from previous UX studies (Bargas-Avila & Hornbaek, 2011). However, the survey construction relies on a literature review conducted by other researchers. This means that the researcher had to rely on the assumption that the review on UX studies was accurate so that all relevant attributes were included in the process of selecting the appropriate attributes for measurement. Since the literature review by Bargas-Avila and Hornbaek

(2011) was reported in detail, the researcher felt confident that it included all relevant studies on UX in a given timeframe.

While reviewing the studies, coding the attributes and grouping them into categories, bias can occur if the right actions are not taken into consideration. To avoid this, two researchers went through the attributes and coded them separately. The results were then compared and no major differences were detected. In addition, three researchers discussed and formed the attribute categories. Although the researcher had little prior knowledge on the subject of UX while constructing the survey, and the groupings were based on data-driven methods, there is still a chance that the researcher's predispositions and assumptions affected the selection of attributes for the survey. Since attributes from all categories were not included (e.g. arousing, captivating, fun) because of their supposed poor suitability for studies in the work context, it can be critiqued whether the instrument measured the concept of UX comprehensively.

Since the survey attributes were the same in different contexts, it can be argued whether the word 'predictable' or 'ergonomic' is perceived in the same manner considering control systems and trucks. This is defined as contextual specificity, which refers to a measure possessing different meanings in different contexts (McDonald, 2005). In addition, there is a chance that the survey translated into Dutch could have been interpreted differently. However, it was a conscious decision to use the same survey in all contexts in order to compare the results of different cases. As a result, similar attributes were considered the most and least important across cases, which indicates that the selection of attributes was acceptable.

There has been critique concerning the external validity of a case study (Yin, 1994) that is often challenging to generalize findings that are studied in single settings. It should also be noted that the number of responses in each case company was fairly little, ranging from four to seventeen, delimiting the possibilities for statistical analysis. Probably because of the small sample sizes it is not possible to derive significant differences or inferences based on the survey results. However, since the survey results are quite similar in all cases regardless of the industry this suggests that the external validity/generalizability of the findings is possible in different industrial contexts. It should also be noted that whereas quantitative surveys usually yield a rather poor response rate, in nearly all case companies the response rate was 100 per cent, which indicates that the survey reached almost every person that was involved in either the NPD process or the use of specific products.

Reliability refers to the extent to which the data collection techniques or analysis procedures will yield consistent findings on repeated trials (Carmines & Woods, 2005; Saunders et al. 2009). If an established survey instrument (e.g. AttrakDiff) would have been used in this study, it could possibly yield more consistent results as they are not specified for any context or industry. Also, the comparability of findings to previous UX survey results was lost by constructing the survey and not selecting an established UX measurement tool. In addition, the inductively derived set of attributes may

not have been systematically ordered or balanced as they were only alphabetically ordered. However, the construction of the measurement instrument is reported in detail which makes it possible for the reader to follow the whole process from selecting the initial studies to selecting the final attributes.

The research objectivity refers to the avoidance of conscious bias and subjective selection during the conducting and reporting of the research (Saunders et al. 2009). Established techniques were used in assessing the results of the survey and all results were openly reported in the study following the discussion of the findings. The conclusions made from the results are straightforward so that it is possible to follow the researcher's reasoning. Although caution has been taken to keep an objective mind, in the end it is left for the reader to decide whether the results are objectively reported.

6.4 Limitations of the study

All research designs can be discussed in terms of their relative strengths and limitations. The design of this research was based on the topic under investigation and the methods for conducting the study were selected by their appropriateness to answer the specified research questions. This chapter introduces the study's limitations to the reader. However, limitations should not be seen as mere deficiencies but also as enablers for further studies to build on the research topic.

The first limitation is based on the selected research strategy. As it is often argued that case study research lacks the possibility to generalize the findings (Flyvbjerg, 2006), this is of concern also in this study. The issues in generalizing the findings were already discussed in the study evaluation. For instance, it is rather challenging to evaluate how well the concept of UX is understood in other companies besides those included in this study and whether they are interested in the topic in their own work. However, based on the results of the study, it is possible to form hypotheses that can be tested systematically with a larger number of cases (e.g. Abercrombie et al. 1984). As there is no agreement on how many case companies are preferably included in a case study (Yin, 1994; Siggelkow, 2007), the suitable amount of cases was determined by the researcher. It can be argued whether three supplier companies and six customer companies were sufficient enough, but based on the findings, the number of cases seemed appropriate for assessing and comparing the findings within and between cases.

There are also limitations related to the methods used in the study. Qualitative studies are argued to be limited by the sensitivity and integrity of the investigator. Since the researcher is the primary instrument of data collection and analysis, they are responsible for reporting the results in an accurate and objective manner. Within this study, triangulation of methods could have been used more effectively to validate the findings of the qualitative part. Also, since the quantitative part of the

study was conducted with a small number of participants, it might have been possible to gain the results by interviews.

Although there are differences in the selected cases and empirical qualitative findings, these differences do not arise from the quantitative study results. Thus, it can be argued whether the quantitative part brought additional value as the most prominent findings of this study are mostly derived from the qualitative interviews. However, without a quantitative measure the comparison between the importance of UX-related attributes would have been more dependent on the researcher's ability to evaluate the findings.

Limitations can be also noted based on the context of the research. One of the most obvious limitations is that the study is mainly conducted with Finnish companies. It would have been interesting to include more international customer companies to compare the results. However, due to time and financial restrictions, in addition to potential language barriers, this was not considered as an acceptable alternative. Another context-specific limitation is the focus on dyadic customer-supplier relationships. It was a conscious decision to leave out other stakeholders from the study. In the case of OEMs and dealers in the sales channels it could have been beneficial to study their influence on the customers' technology investment decisions. In addition, other members within the case companies could have brought more insight into the studied topics. For instance, people working in maintenance could have had considerable knowledge of UX and how well the suppliers have succeeded in providing the required tools for work in the customer companies.

One issue that should be taken into consideration is the time limitation. As value and experience are subjectively determined, context-specific and influenced by a number of aspects, it also changes in time. In the investment decision, price might be one of the initial reasons for purchase but the relationship with the supplier might have a larger impact after having transactions with the same parties during a long period of time. The user's experience can be very different when using a product for the first time and after using it for several years. In order to avoid this limitation, more longitudinal studies should be conducted considering both customer value and UX in order to identify potential changes in the evaluation of these topics.

6.5 Recommendations for further research

Since this was one of the first attempts to study UX in B2B-relationships, there are still several issues to be explored in order to gain a comprehensive understanding of the phenomenon from the suppliers' and customers' perspective. Based on the findings and the limitations of the study, some suggestions for further research can be brought forward. For instance, one of the most interesting topics could be exploring how UX and CX can be more effectively communicated to customers and users by the supplier company. It was stated that a traditional list of sales arguments are not con-

sidered practical and that visits to customer reference sites are a more reliable way to convey the feelings and experiences of actual users. However, it would be interesting to study how, for example, video material could be used in communicating UX and what the response of potential customers would be to this kind of material. In addition, the customer contact points should be identified to understand how and where customer experience is being created.

Considering the technology investment decision of customers, a larger quantitative study could be done in order to identify the criteria used for different kinds of purchases. In addition, a quantitative study would be able to evaluate how important UX-related issues are compared to other criteria such as economics or qualities of relationships. By using a qualitative method there is a chance that the interviewees might not remember to articulate all the reasons for their supplier selection. Seeing a comprehensive list of attributes could make it easier to evaluate whether they had impact on the decision and how the respondents would weigh the attributes compared to another.

Lack of clarity still exists considering the relationship between UX, CX and value. Although it was noted within this research that these concepts relate to one another, more emphasis should be put on how to evaluate the value of experience. This is a rather challenging and somewhat daunting topic since value and experience are both subjective perceptions that change over time. However, it would especially introduce important managerial implications on how to argue the value of experience within a company and to the customers.

As the recognitions of the importance of UX start within a company it would be interesting to study how to build a UX-mindset so that all employees understand their role in building experiences for customers and users. This is particularly a strategic issue since building a new mindset requires changes in the organizational culture and a commitment from top management to implement this kind of change. In the end, adjustment to any type of change takes time, whether or not a person is willing to accept the alteration of something they have considered constant. Maybe someday providing experiences in any context will be what every company is striving for in their business.

References

Abercrombie, N.; Hill, S. & Turner, B.S. (1984). Dictionary of Sociology. Harmondsworth: Penguin. 266 p.

Abramov, V. (2012). Conveying User Experience in Business-to-Business Environment: A Case Study from Metal and Engineering Industry. Master of Arts Thesis, Aalto University, 169 p.

Ahola, T.; Laitinen, E.; Kujala, J. & Wikström, K. (2008). Purchasing strategies and value creation in industrial turnkey projects. International Journal of Project Management, 26: 87–94.

Albadvi, A. & Hosseini, M. (2011). Mapping B2B value exchange in marketing relationships: a systematic approach. Journal of Business & Industrial Marketing, 26(7): 503-513.

Alben, L. (1996). Quality of experience. Defining the criteria for effective interaction design. Interactions, 3(3): 11-15.

Aldrich, H.E. & Ruef M. (2006). Organizations Evolving (2nd edn). SAGE Publishers: Thousand Oaks, CA.

Andersen, P.H. & Kumar, R. (2006). Emotions, trust and relationship development in business relationships: A conceptual model for buyer–seller dyads. Industrial Marketing Management, 35: 522 – 535.

Andersen, P.H.; Christensen, P.R. & Damgaard, T. (2009). Diverging expectations in buyer-seller relationships: Institutional contexts and relationship norms. Industrial Marketing Management, 38: 814-824.

Anderson, E. & Weitz, B. (1989). Determinants of continuity in conventional industrial channel dyads. Marketing Science, 8 (Fall): 310-23.

Anderson, J. C., & Narus, A. (1984). A model of the distributor's perspective of distributor–manufacturer working relationships. Journal of Marketing, 48(Fall): 62–74.

Anderson, J. C. & Jain, D.; Chintagunta, P. (1993). Customer value assessment in business markets: A state-of-practice study. Journal of Business-to-Business Marketing, 1(1): 3-29.

Anderson, J. C. & Narus, J. A. (1998). Business marketing: Understanding what customers value. Harvard Business Review, 76(November-December): 53-65.

Anderson, J. C.; Thomson, J. B. L. & Wynstra, F. (2000). Combing value and price to make purchase decisions in business markets. International Journal of Research in Marketing, 17: 307-329.

Anderson, J.C. & Narus, J.A. (2003). Business Market Management: Understanding, Creating, and Delivering Value. (2nd ed.) Upper Saddle River, N.J. : Pearson Prentice Hall, 460 p.

Anderson, J. C.; Narus, J. A. & van Rossum, W. (2006). Customer Value Proposition in Business Markets. Harvard Business Review, (March 2006): 1-9.

Andersson, P. & Soderlund, M. (1988). The network approach to marketing. Irish Marketing Review, 3: 63–67.

Argote, L., Ingram, P., Levine, J. M., & Moreland, R. L. (2000). Knowledge transfer in organizations: Learning from the experience of others. Organizational Behavior and Human Decision Processes, 82(1): 1−8.

Arhippainen, L. (2009). Studying User Experience: Issues and Problems of Mobile Services – Case Adamos: User Experience (Im)possible to catch? Dissertation. University of Oulu, 245 p.

Arino, A., dela Torre, J., & Ring, P. S. (2001). Relational quality: Managing trust in corporate alliances. California Management Review, 44: 109– 131.

Ballantyne, D.; Frow, P.; Varey, R.J. & Payne, A. (2011). Value propositions as communication practice: Taking a wider view. Industrial Marketing Management, 40: 202-210.

Baraldi, E., & Strömsten, T. (2006). Embedding, producing and using low weight: Value creation and the role of the configuration of resources interfaces in the networks around Ikea's lack table and Holmen's newsprint. IMP Journal, 1(1): 39–69.

Bargas-Avila, J. A. & Hornbaek, K. (2011) Old Wine in New Bottles or Novel Challenges? A Critical Analysis of Empirical Studies of User Experience. CHI 2011, May 7-12, 2011, Vancouver, BC, Canada, pp. 2689-2698.

Barnes, B.R., Naudé, P. & Michell, P. (2007). Perceptual gaps and similarities in buyer-seller dyadic relationships. Industrial Marketing Management, 36: 662-675.

Barnes, J. G. (1994). Close to the customer: But is it really a relationship? Journal of Marketing Management, 10: 561–570.

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1): 99-120.

Barwise, P. (1995). Marketing today and tomorrow. Business Strategy Review, 6(1): 45–57.

Batra, R. & Ahtola, O. T. (1990). Measuring the hedonic and utilitarian sources of consumer choice. Marketing Letters, 2: 159-170.

Beatty, S. E., Mayer, M., Coleman, J. E., Reynolds, K. E., & Lee, J. (1996). Customer-sales associate retail relationships. Journal of Retailing, 72(3): 223–247.

Benbasat, I.; Goldstein, D. K. & Mead, M. (1987). The Case Research Strategy in Studies of Information Systems. MIS Quarterly, 11(3): 369-386.

Berling, R. J. (1993). The emerging approach to business strategy: Building a relationship advantage. Business Horizons (July-August): 16–27.

Berry, L.L., Carbone, L.P. and Haeckel, S.H. (2002). Managing the total customer experience. MIT Sloan Management Review, 43(3): 85-89.

Bevan, N. (1999). Quality in Use: Meeting User Needs for Quality. Journal of System and Software, 49(1): 89–96.

Bevan, N. (2008). Classifying and Selecting UX and Usability Measures. In Proc. COST294-MAUSE Workshop: Valid Useful User Experience Measurement (VUUM). Reykjavik, Island, (2008) pp. 13-18.

Black, J.A. & Boal, K.B. (1994). Strategic resources: traits, configurations and paths to sustainable competitive advantage. Strategic Management Journal, 15: 131-148

Blois, K. (1996). Relationship marketing in organizational markets: When is it appropriate? Journal of Marketing Management, 12: 161–173.

Boles, J. S., Barksdale, H. C., & Johnson, J. T. (1996). What national account decision makers would tell salespeople about building relationships. Journal of Business and Industrial Marketing, 11(2), 6–19.

Bower, J. L. & Christensen, C. M. (1995). Disruptive technologies: catching the wave. Harvard Business Review, 73(1): 43.

Boztepe, S. (2007). User value: Competing theories and models. International Journal of Design, 1(2): 55-63.

Bradley, M.M. & Lang, P.J. (1994) Measuring emotion: the Self-Assessment Manikin and the Semantic Differential, Journal of Behavior Therapy and Experimental Psychiatry, 25(1): 49-59.

Buchner, R., Wurhofer, D., Weiss, A. and Tscheligi, M. (2012) User experience of industrial robots over time. ACM/IEEE International Conference, Boston MA, 5-8 March 2012, Human-Robot Interaction (HRI), pp. 115-116.

Burns, M. J. & Woodruff, R. B. (1992). Delivering value to consumers: implications for strategy development and implementation. In Allen, C.T.; Madden, T.J.; Shimp, T.A.; Howell, R.D.; Zinkhan, G.M.; Heisley, D.D.; Semenik, R.J.; Dickson, P.; Zeithaml, V. & Jenkins, R.L. (eds), 1992 AMA Winter Educators' Conference: Marketing Theory and Applications, pp. 209-216.

Buttle, F. (1999). The SCOPE of customer relationship management, International Journal of Customer Relationship Management, 1(4): 327-36.

Butz, H. E. & Goodstein, L. D. (1996) Measuring Customer Value: Gaining the Strategic Advantage. Organizational Dynamics, 24(3): 63-77.

Campbell, A. J., & Wilson, D. T. (1996). Managed networks: Creating strategic advantage. In D. Iacobucci (Ed.), Networks in marketing (pp. 125–143). CA, USA: Sage.

Cannon, J.P. & Homburg, C. (2001). Buyer-Supplier Relationships and Customer Firm Costs. Journal of Marketing, 65(January): 29-43.

Carmines, E.G. & Woods, J.A. (2005). Validity Assessment, in Encyclopedia of Social Measurement, ed. K.K. Leonard, Elsevier: 933-937.

Chamberlain, G.P. (2006). Researching strategy formation process: An abductive methodology. Quality & Quantity, 40 (2): 289-301.

Cheung, C.M.K. and Thadani, D.R. (2012). The impact of electronic word-of-mouth communication: a literature analysis and integrative model. Decision Support Systems, 54(1): 461-470.

Cho, D. S., & Chu, W. (1994). Determinants of bargaining power in OEM negotiations. Industrial Marketing Management, 23: 343–355.

Christensen, C. M. & Overdorf, M. (2000). Meeting the challenge of disruptive change. Harvard Business Review, 78(2): 66-77.

Christopher, M., Payne, A. and Ballantyne, D. (1991). Relationship Marketing: Bringing Quality, Customer Service and Marketing Together. Oxford, Butterworth-Heinemann, p.

Cockton, G. (2002), From doing to being: bringing emotion into interaction. Interacting with Computers, 14: 89-92.

Colville, A. (23.3.2010). Taming Goliath: Selling UX to Large Companies. [http://www.uxbooth.com/articles/taming-goliath-selling-ux-to-large-companies-part-1-of-2/] Date of access: 16.06.2014.

Corsaro, D. & Snehota, I. (2010). Searching for Relationship Value in Business Markets: Are We Missing Something?, Industrial Marketing Management, 39(6): 986-995.

Corsaro, D.; Ramos, C.; Henneberg, S. C. & Naude, P. (2012). The impact of network configurations on value constellations in business markets – The case of an innovation network. Industrial Marketing Management, 41(1): 54-67.

Costello, B. & Edmonds, E. (2007). A study in play, pleasure and interaction design. Designing Pleasurable Products and Interfaces, Helsinki, Finland, 22-25 August 2007. DPPI '07 Proceedings of the 2007 conference on Designing pleasurable products and interfaces, 76-91.

Creswell, J. W. (2003). Research design – Qualitative, quantitative, and mixed methdos approaches. (2nd ed.). Sage Publications, 246 p.

Cunningham, M. T. & White, J. G. (1973). The determinants of choice of supplier. European Journal of Marketing, 7(3): 189–202.

Dabholkar, P. A., & Neeley, S. M. (1998). Managing interdependency: A taxonomy for business-to-business relationships. Journal of Business and Industrial Marketing, 13(6): 439–460.

Damodaran, L. (1996). User involvement in the systems design process – a practical guide for users. Behaviour & Information Technology, 15: 363-377.

Davis, R., & Buchanan-Oliver, M. (1998). Retailer–consumer marketing relationships in a computer-mediated environment (CME). Proceedings of The 6th International Colloquium in Relationship Marketing, Department of Marketing. New Zealand: University of Auckland.

Dawson, R. (2000). Developing Knowledge-Based Client Relationships. Woburn, USA: Butterworth Heinemann, 275 p.

Day, G. S. (2000). Managing market relationships. Academy of Marketing Science Journal, 28(1): 24–30.

Del Angel, K. (5.8.2013). The Competitive Advantage of Great User Experience: A Chat with Jared Spool. [http://delight.us/the-competitive-advantage-of-user-experience-a-chat-with-jared-spool/] Date of access: 8.7.2014.

Denzin, N.K. (1978). The Research Act, 2d ed. New York: McGraw-Hill.

Desmet, P.M.A. & Hekkert, P. (2002). The basics of product emotions, in Pleasure with Products: beyond usability. Green, W. & Jordan, P. (Eds.), London: Taylor-Francis, pp. 60-68.

Dhar, R. & Wertenbroch, K. (2000). Consumer choice between hedonic and utilitarian goods. Journal of Marketing Research, 37: 60-71.

Diefenbach, S. (2011). The Dilemma of the Hedonic – Appreciated, but Hard to Justify. Dissertation, the University of Koblenz-Landau, 92 p.

Dilworth, J. & Miller, M. (6.5.2011). Communicating the UX Value Proposition. [http://uxmag.com/articles/communicating-the-ux-value-proposition] Date of access: 7.7.2014.

Doney, P.M. & Cannon, J. (1997). An Examination of the Nature of Trust in Buyer-Seller Relationships. Journal of Marketing 61 (April): 35-51.

Doyle, P. (1995). Marketing in the new millennium. European Journal of Marketing, 29(13): 23-41.

Dwyer, F. R.; Schurr, P. & Oh, S. (1987). Developing Buyer-Seller Relationships. Journal of Marketing, 52 (April): 11-27.

Dyer, W.G.J. & Wilkins, A.L. (1991) Better stories, not better constructs, to generate better theory: A rejoinder to Eisenhardt. Academy of Management Review, 16 (3): 613-619.

Easterby-Smith, M; Lyles, M. A. & Tsang, E. W K. (2008). Inter-organizational knowledge transfer: current themes and future prospects, Journal of Management Studies, 45(4): 677-690.

Eggert, A. & Ulaga, W. (2002). Customer perceived value: a substitute for satisfaction in business markets. Journal of Business & Industrial Marketing, 17(2/3): 107-118.

Eggert, A.; Ulaga, W. & Schultz, F. (2006). Value creation in the relationship life cycle: A quasi-longitudinal analysis. Industrial Marketing Management, 35: 20 – 27.

Eisenhardt, K.M. (1989). Building theories from case study research. Academy of Management Review, 1(4): 532-550.

Emerson, R.F. (1981). Social Exchange Theory, in Social Psychology: Sociological Perspectives, Monis Rosenberg and Ralph Turner, eds. New York: Basic Books, 30-65.

Erlandson, D.A. (1993) Doing Naturalistic Inquiry: A Guide to Methods. London: Sage Publications, 198 p.

Ernst, H.; Hoyer, W.D. & Rübsaamen, C. (2010). Sales, marketing, and research-and-development cooperation across new product development stages: Implications for Success. Journal of Marketing, 74 (Sep): 80-92.

Ettlie, J., & Ward, P. T. (1997). US manufacturing in the early 1990s: The chase and challenge. Business Strategy Review, 8(4): 53–59.

Fjeldstad, O.D.; Snow, C.C., Miles, R. & Lettl, C. (2012). The architecture of collaboration. Strategic Management Journal, 33(6): 734-750.

Fletcher, K. P., & Peters, L. D. (1997). Trust and direct marketing environments: A consumer perspective. Journal of Marketing Management, 13: 523–539.

Fletcher, M. & Plakoyiannaki, E. (2011) Case Selection in International Business: Key Issues and Common Misconceptions. In Rethinking the Case Study in International Business and Management Research, Edited by Rebecca Piekkari and Catherine Welch, 21 p.

Flint, D. J.; Woodruff, R. B. & Gardial, S. F. (1997). Customer value change in industrial marketing relationships: A call for new strategies and research. Industrial Marketing Management, 26: 163-175.

Flint, D. & Mentzer, J. (2006). Striving for integrated value chain management. In R.F. Lusch & S.L. Vargo (Eds.) The Service Dominant Logic of Marketing: Dialog, debate and directions. Armonk, New York: M.E. Sharp, pp. 139-149.

Flyvberg, B. (2006). Five misunderstanding about case-study research. Qualitative Inquiry, 12(2): 219-245.

Ford, D., McDowell, R., & Tomkins, C. (1996). Relationship strategy, investments, and decision making. In Iacobucci, D. (Ed.), Networks in marketing, CA: Sage, pp. 144–176.

Ford, D.; Gadde, L.-E.; Håkansson, H. & Snehota, I. (2011). Managing Business Relationships. 3rd edition. Hoboken, NJ; Wiley, 238 p.

Forgas, J. P. (1995). Mood and Judgement: The Affect Infusion Model (AIM). Psychological Bulletin, 117 (1): 39-66.

Forlizzi, J. & Ford, S. (2000). The Building Blocks of Experience: An Early Framework for Interaction Designers. Proc Designing Interactive Systems: processes, practices, methods and techniques. New York, NY, USA, pp. 419-423.

Forlizzi, J. & Battarbee, L. (2004). Understanding Experience in Interactive Systems. Proc Designing Interactive Systems: processes, practices, methods and techniques. Cambridge, MA, USA, pp. 261-268.

Freeman, B. (2014). Gaining Competitive Advantage: Rethinking “The Competition”. User Experience Magazine, 14(1).
[http://www.usabilityprofessionals.org/uxmagazine/gaining-competitive-advantage/]

Freeman, R.E. (1984). Strategic Management: A Stakeholder Approach. New York, NY: Pitman/Ballinger, 276 p.

Frow, P. & Payne, A. (2008). The value propositions concept: evolution, development and application in marketing. Discipline of Marketing, University of Sydney, Sydney, Working Paper.

Frow, P. & Payne, A. (2011). A stakeholder perspective of the value proposition concept. European Journal of Marketing, 45(½): 223-240.

Gadde, L.E.; Huemer, L. & Håkansson, H. (2003) Strategizing in industrial networks. Industrial Marketing Managament, 32(5): 357-364.

Gale, B.T. (1994), Managing Customer Value: Creating Quality and Service that Customers Can See, The Free Press, New York, NY, 424 p.

Ganesan, S. (1994). Determinants of long-term orientation in buyer-seller relationships. Journal of Marketing, 58(October): 1-19.

Gaver & Martin (2000). Alternatives: exploring information appliances through conceptual design proposals, CHI '00 Proceedings of the SIGCHI conference on Human Factors in Computing Systems, pp. 209-216.

Gebauer, H., Fleisch, E. and Friedli, T. (2005). Overcoming the service paradox in manufacturing companies. European Management Journal, 23(1): 14–26.

Gibbs, W. W. (1994). Software‘s chronic crisis.Scientific American, 3: 72-81.

Gordon, I. (1998). Relationship marketing: New strategies, techniques and technologies to win the customers you want and keep them forever. Ontario, Canada: John Wiley and Sons, 314 p.

Gremler, D.D. (1994). Word-of-mouth about service providers: an illustration of theory development in marketing. In Park, C.W. and Smith, D.C. (Eds), 1994 AMA Winter Educator’s Conference: Marketing Theory and Applications, American Marketing Association, Chicago, pp. 62-70.

Griffin, A. & Hauser, J.R. (1996). Integrating R&D and marketing: A review and analysis of the literature. Journal of Product Innovation Management, 13(3): 191-215.

Grönroos, C. (2004). The relationship marketing process: communication, interaction, dialogue, value. Journal of Business & Industrial Marketing, 19(2): 99-113.

Grönroos, C. & Voima, P. (2013). Critical service logic: making sense of value creation and co-creation. Journal of the Academy of Marketing Science, 41: 133-150.

Guba, E.G. (1981) Criteria for Assessing the Trustworthiness of Naturalistic Inquiries. Educational Communication and Technology, 29(2): 75-91.

Guba, E. & Lincoln, Y. (1994). Competing paradigms in qualitative research. in N.K. Denzin and Y.S. Lincoln (eds) Handbook of Qualitative Research. London: Sage, 643 p.

Gulliksen, J.; Göransson, B.; Boivie, I.; Blomkvist, S.; Persson, J. & Cajander, Å. (2003). Key principles for user-centred systems design. Behaviour and Information Technology, 22 (6): 397-410.

Gummesson, E. (1987). The new marketing—developing long-term interactive relationships. Long Range Planning, 20(4): 10–20.

Gummesson, E. (1993). Case Study Research in Management: Methods for Generating Qualitative Data. Stockholm University, Department of Business Administration.

Gummesson, E. (1995), Relationship Marketing: from 4Ps to 30Rs, Liber-Hermods, Malmö.

Gummesson, E. (2000) Qualitative Methods in Management Research. Sage, Thousand Oaks, CA, 250 p.

Gummesson, E. (2002). Relationship marketing in the new economy, Journal of Relationship Marketing, 1(1): 37-57.

Gundlach, G. T., Achrol, R. S., & Mentzer, J. T. (1995). The structure of commitment in exchange. Journal of Marketing, 59(January): 78–92.

Gupta, A.K; Raj, S.P. & Wilemon, D. (1986). A model for studying R&D-Marketing interface in the product innovation process. Journal of Marketing, 50 (april): 7-17.

Gutman, J. (1982). A means-end chain model based on consumer categorization processes. Journal of Marketing, 46(2): 60-72.

Hanmer-Lloyd, S. A. (1996). Relationship appraisal: A route to improved reseller channel performance. Industrial Marketing Management, 25: 173–185.

Harbich, S. and Hassenzahl, M. (2008). Beyond task completion in the workplace: execute, engage, evolve, expand. In Peter, C. and Beale, R. (Eds.): Affect and Emotion in HCI, pp.154–162.

Hartmann, J.; De Angeli, A. & Sutcliffe, A. (2008a). Framing the User Experience: Information Biases on Website Quality Judgement. Exploring Web Content, April 5-10 2008, Florence, Italy CHI 2008 Proceedings, pp. 855-864.

Hartmann, J.; Sutcliffe, A. & Angeli, A. (2008b). Towards a theory of user judgment of aesthetics and user interface quality. ACM Transactions on Computer-Human Interaction, 15(4):1–30.

Hartson, R. & Pyla, P.S. (2012). The UX Book: Process and Guidelines for Ensuring a Quality User Experience. Elsevier, 968 p.

Hassenzahl, M. (2001). The effect of perceived hedonic quality on product appealingness. International Journal of Human-Computer Interaction, 13: 479-497.

Hassenzahl, M. (2003). The thing and I: understanding the relationship between user and product. In Blythe, M.; Overbeeke, C.; Monk, A. F. & Wright, P. C. (eds.) Funology: From Usability to Enjoyment. Dordrecht, Kluwer Academic Publishers, pp. 31-42.

Hassenzahl, M.; Burmester, M. & Koller, F. (2003). AttrakDiff: Ein Fragebogen zur Messung wahrgenommener hedonischer und pragmatischer Qualität. Mensch & Computer 2003, Berichte des German Chapter of the ACM Volume 57, 187-196.

Hassenzahl, M. (2004). The Interplay of Beauty, Goodness, and Usability in Interactive Products. Human-Computer Interaction, 19: 319–349.

Hassenzahl, M. & Tractinsky, N. (2006). User Experience – a research agenda. Behavior and Information Technology, 25(2): 91-97.

Hassenzahl, M. (2007). The hedonic/pragmatic model of user experience, in “Towards a UX Manifesto”, COST294-MAUSE affiliated workshop, Law, E.; Vermeeren, A., Hassenzahl, M. & Blythe, M. (Eds). 3rd September 2007, Lancaster, UK, pp. 10-14

Heide, J. B., & John, G. (1988). The role of dependence balancing in safeguarding transaction-specific assets in conventional channels. Journal of Marketing, 52: 20–35.

Heide, J. & John, G. (1992). Do norms matter in marketing relationships? Journal of Marketing, 58 (January): 32-44.

Herriot, R. E. & Firestone, W. A. (1983). Multisite qualitative policy research: Optimizing description and generalizability. Educational Researcher, 12: 14-19.

Higgins, K. T. (1998). The value of customer value analysis. Marketing Research, 10(Winter/Spring): 39-44.

Hiltunen M, Laukka M & Luomala J (2002). Mobile User Experience. Finland, Edita Publishing, 214 p.

Holbrook, M. B. (1994). The Nature of Customer Value. In R.T. Rust and R. L. Oliver (eds.), Service Quality: New Directions in Theory and Practice. Sage, Newbury Park, CA, pp. 21-72.

Holtzblatt, K., Wendell, J.B., & Wood, S. (2005). Rapid Contextual Design. San Francisco, CA: Morgan Kaufman/Elsevier, 313 p.

Homburg, C.; Giering, A. & Menon, A. (2003). Relationship Characteristics as Moderators of the Satisfaction-Loyalty Link: Findings in a Business-to-Business Context. Journal of Business-to-Business Marketing, 10(3): 35-62.

Homburg, C. & Jensen, O. (2007). The thought worlds of marketing and sales: Which differences make a difference? Journal of Marketing, 71 (July): 124-42.

Huber, F.; Herrmann, A. & Morgan, R. E. (2001). Gaining competitive advantage through customer value oriented management. The Journal of Consumer Marketing, 18(1): 41-53.

Huemer, L. (2006). Supply management – Value creation, coordination and positioning in supply relationships. Long Range Planning, 39(2): 133-153.

Hutt, M. D. & Speh, T. W. (1998) Business Marketing Management: A Strategic View of Industrial and Organizational Markets, (6th ed.) Florida: The Dryden Press, 777 p.

Hutt, M.D. & Speh, T.W. (2013) Business Marketing Management: B2B. 11th ed, 444 p.

Hyde, K. F. (2000). Recognising deductive process in qualitative research. Qualitative Research Methods: An International Journal, 3: 82-89.

Hyysalo, S. (2009) Käyttäjä tuotekehityksessä – Tieto, tutkimus, menetelmät. Helsinki: Taideteollisen Korkeakoulun julkaisu B 97, Otavan Kirjapaino Oy, 320 p.

Håkansson, H. (1982). International Marketing and Purchasing of Industrial Goods: An Interaction Approach. Chichester: John Wiley & Sons, 406 p.

Håkansson, H., & Johanson, J. (1992). A model of industrial networks. In B. Axelson & G. Easton (Eds.), Industrial networks: a new view of reality London: Routledge.

Håkansson, H., & Snehota, I. J. (1995). Developing relationships in business networks. London, UK: Routledge, 418 p.

Håkansson, H. & Ford, D. (2002). How should companies interact in business networks? Journal of Business Research, 55: 133-139.

ISO 9241-11 (1998). Ergonomic requirements for office work with visual display terminals (VDTs) – Part 11: Guidance on usability (ISO No. 9241).

ISO 9241-210 (2010) Ergonomic of Human-System Interaction. Part 210: Human-Centred Design for Interactive Systems.

Isomursu, M.; Tähti, M.; Väinämö, S. & Kuutti, K. (2007). Experimental evaluation of five methods for collecting emotions in field settings with mobile applications. International Journal of Human-Computer Studies, 65(4): 404–418.

Jackson, B. B. (1985). Build customer relationships that last. Harvard Business Review, (Nov-Dec): 120–128.

Jalkala, A. & Salminen, R. (2010). Practices and functions of customer reference marketing — Leveraging customer references as marketing assets. Industrial Marketing Management, 39(6): 975-985.

Jarillo, C. (1988). On strategic networks. Strategic Management Journal, 9(1): 31–41.

Jaworski, B.J. & Kohli, A.K. (2006). Co-creating the voice of the customer. In R.F. Lusch & S.L. Vargo (Eds.) The Service Dominant Logic of Marketing: Dialog, debate and directions. Armonk, New York: M.E. Sharp. pp. 139-149.

Johanson, J., & Mattson, L. G. (1988). Internationalisation in industrial systems — a network approach. In N. Hood, & J. E. Vahlne (Eds.), Strategies in global competition USA: Croom. (pp. 287–314).

Johnston, R. & Kong, X. (2011). The customer experience: A road-map for improvement. Managing Service Quality, 21(1): 5-24.

Jokela, T. (2004). When good things happen to bad products: Where are the benefits of usability in the consumer appliance market? ACM Interactions, 11(6): 28-35.

Joshi, A. W., & Arnold, S. J. (1997). The impact of Buyer dependence on buyer opportunism in buyer-supplier relationships: the moderating role of relational norms. Psychology & Marketing, 14(8): 823−845.

Jumisko-Pyykkö, S.; Weitzel, M. & Strohmeier, D. (2008). Designing for user experience: what to expect from mobile 3d tv and video? In Proc. UXTV ’08: 183–192.

Jumisko-Pyykkö, S. (2011) User-Centered Quality of Experience and Its Evaluation Methods for Mobile Television, PhD thesis, Tampere University of Technology, Tampere, Finland.

Kambil, A.; Ginsberg, A. & Bloch, M. (1996). Re-inventing value propositions. Working Paper, New York University, New York, NY.

Katz, E. and Lazarsfeld, P.F. (1955). Personal Influence: The Part Played by People in the Flow of Mass Communications. Glencoe, IL, The Free Press,

Kaye, J. J. & Taylor, A. (2006). What does science know about experiences? Alternative approaches to evaluating user experience. NordiCHI 2006 Workshop: User Experience – Towards a unified view. Oslo, Norway.

Kaye, J. (2007). Evaluating experience-focused HCI. In CHI '07 Extended Abstracts on Human Factors in Computing Systems CHI '07. ACM, New York, NY, 1661-1664.

Khalifa, A. S. (2004). Customer value: a review of recent literature and an integrative configuration. Management Decision, 42(5): 645-666.

Kim, H. (2014). The role of WOM and dynamic capability in B2B transactions. Journal of Research in Interactive Marketing, 8(2):84-101.

Kim, J. & Moon, J.Y. (1998). Designing towards emotional usability in customer interfaces – trustworthiness of cyber-banking system interfaces. Interacting with Computers, 10: 1-29.

Kim, W.C. & Mauborgne, R. (1999). Creating New Market Space. Harvard Business Review, (Jan-Feb): 1-12.

Kirakowski, J. (1996) The software usability measurement inventory: background and usage. In Usability Evaluation in Industry, Eds Jordan, P. W.; Thomas, B.; Weerdmeester, B. A. & McClelland, I. L. Taylor & Francis, pp. 169-178.

KONE (2014). [http://www.kone.com/en/company/our-brand/] Date of access: 8.7.2014

Kordupleski, R. T. & Laitamäki, J. (1997). Building and deploying profitable growth strategies based on the waterfall of customer value added. European Management Journal, (April): 158.

Kothandaraman, P. & Wilson, D. T. (2000). Implementing Relationship Strategy. Industrial Marketing Management, 29: 339-349.

Kotler, P. (1992). It's time for total marketing, Business Week Advance, Executive Brief, p. 2.

Kotler, P. & Armstrong, G. (1993) Marketing – An Introduction.(3rd ed.). Englewood Cliffs, Ne Jersey, Prentice-Hall, 632 p.

Kotler, P. (2003). Marketing Management. Upper Saddle River, New Jersey: Prentice Hall, 738 p.

Kotler, P.; Rackham, N. & Krishnaswamy, S. (2006). Ending the war between sales & marketing. Harvard Business Review, 84(7-8): 68-78.

Kujala, S. (2003). User involvement: a review of the benefits and challenges. Behaviour & Information Technology, 22(1): 1-16.

Kujala, S. (2008). Effective user involvement in product development by improving the analysis of user needs. Behaviour & Information Technology, 27(6): 457-473.

Kumar, N., Scheer, L. K., & Steenkamp, J. B. E. M. (1995). The effects of perceived interdependence on dealer attitudes. Journal of Marketing Research, 32 (Aug.): 348–356.

Kurosu, M. & Kashimura, K. (1995). Apparent usability vs. inherent usability. In Proceedings of the CHI 1995 Conference Companion on Human Factors in Computing Systems, New York: ACM, Addison-Wesley, pp. 292-293

Laczniak, G. (2006). Some societal and ethical dimensions of the service-dominant logic perspective of marketing, in Lusch, R. and Vargo, S. (Eds), The Service-Dominant Logic of Marketing: Dialog, Debate and Directions, M.E. Sharpe, Armonk, NY, pp. 279-85.

Lang, P.J. (1980). Behavioral treatment and bio-behavioral assessment: computer applications. In J.B. Sidowski, J.H. Johnson, & T.A. Williams (Eds.), Technology in mental healthcare delivery systems. Norwood, NJ: Ablex. pp. 119-l37.

Langley, A. (1999). Strategies for theorizing from process data. Academy of Management Review, 24(4): 691-710.

Lankes, M.; Riegler, S.; Weiss, A.; Mirlacher, T.; Pirker, M. & Tscheligi, M. (2008). Facial Expressions as Game Input with Different Emotional Feedback Conditions. ACE '08 Proceedings of the 2008 International Conference on Advances in Computer Entertainment Technology, pp. 253-256.

Lanning, M. (1998). Delivering profitable value: a revolutionary framework to accelerate growth, generate wealth and rediscover the heart of business. Perseus Publishing, New York, NY, 320 p.

Lapierre, J. (2000). Customer-perceived value in industrial context. Journal of Business & Industrial Marketing, 15(2/3): 122-140.

Lavie, T. & Tractinsky, N. (2004). Assessing dimensions of perceived visual aesthetics of web sites. International Journal Human-Computer Studies, 60: 269–298.

Law, E.; Roto, V. Vermeeren, APOS; Kort, J. & Hassenzahl, M. (2008). Towards a shared definition of user experience. Proc Human Factors in Computing Systems (extended abstract), Florence, Italy, pp. 2395-2398.

Law, E. L.-C.; Roto, V.; Hassenzahl, M.; Vermeeren, A.P.O.S. & Kort, J. (2009). Understanding, Scoping and Defining User eXperience: A Survey Approach, CHI 2009, April 4–9, 2009, Boston, MA, USA, pp. 719-728.

Lee, J. (18.5.2014). User Experience (UX) as Competitive Advantage. [http://www.linkedin.com/today/post/article/20140518152353-73005678-user-experience-ux-as-competitive-advantage] Date of access: 8.7.2014.

Levitt, T. (1983). After the sale is over. Harvard Business Review, 61(5): 87–93.

Lincoln, Y.S. & Guba, E.G., (1985). Naturalistic Inquiry. Sage Publications Inc., Newbury Park, London, New Delhi, 416 p.

Lindic, J. & da Silva, C. M. (2011). Value proposition as a catalyst for a customer focused innovation. Management Decision, 49(10): 1694-1708.

Lindgreen, A. & Wynstra, F. (2005). Value in business markets: What do we know? Where are we going? Industrial Marketing Management, 34 (7): 732-748.

Lindgreen, A. & Hingsley, M. K.; Grant, D.B. & Morgan, R.E. (2012). Value in business and industrial marketing: Past, present, and future. Industrial Marketing Management, 41: 207-214.

Liu, A. H.; Leach, M. P. & Bernhardt, K. L: (2005). Examining customer value perceptions of organizational buyers when sourcing from multiple vendors. Journal of Business Research, 58: 559-568.

Liu, N.; Liu, Y.; Liu, L. & Wang, X. (2009). User experience evaluation of Post-Traumatic Mobile Service: a case study. In Proc. Mobile Technology, Application & Systems, pp. 1–4.

Lozano, J.M. (2005). Towards the relational corporation: from managing stakeholder relationships to building stakeholder relationships, Corporate Governance, 5(2): 60-77.

Lusch, R.F., Vargo, S. & Tanniru, M. (2010) Service, value networks and learning. Journal of the Academy of Marketing Science, 38(1): 19-31.

Löytänä, J. & Kortesuo, K. (2011). Asiakaskokemus – palvelubisneksestä kokemusbisnekseen. Helsinki, Talentum, 232 p.

Löytänä, J. & Korkiakoski, K. (2014). Asiakkaan aikakausi – rohkeus + rakkaus = raha.

Macdonald, E. K.; Wilson, H.; Martinez, V. & Toossi, A. (2011). Assessing value-in-use: A conceptual framework and exploratory study. Industrial Marketing Management, 40: 671-682.

Macleod, M. (1996). Performance Measurement and Ecological Validity, in Usability Evaluation in Industry, eds. Jordan, P. W.; Thomas, B.; Weerdemeester, B. A. & McClelland, I. L., Taylor & Francis, pp. 227-235.

Maguire, M. (2001). Methods to support human-centred design. International Journal of Human-Computer studies, 55: 587-634.

Mahlke, S. & Thuring, M. (2007) Studying antecedents of emotional experiences in interactive contexts. CHI '07 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 915-918.

Mahlke, S. (2008) User Experience of Interaction with Technical Systems - Theories, Methods, Empirical Results, and Their Application to the Development of Interactive Systems, Doctoral Dissertation, der Technischen Universität Berlin, 194 s.

Mandryk, R.; Inkpen, K. & Calvert, T. (2006) Using psychophysiological techniques to measure user experience with entertainment technologies. Behaviour & Information Technology, 25(2): 141–158.

Matthyssens, P., & Van den Bulte, C. (1994). Getting closer and nicer: Partnerships in the supply chain. Long Range Planning, 27(1): 72–83.

Matthyssens, P.; Vandenbempt, K. & Berghman, L. (2006). Value innovation in business markets: Breaking the industry recipe. Industrial Marketing Management, 35: 751-761.

McDonald, M.P. (2005). Validity, Data Sources, in Encyclopedia of Social Measurement, Vol. 3. Kimberly Kempf-Leonard, ed. San Deigo, CA: Elsevier Inc.

McIvor, R., Humphreys, P., & McAleer, E. (1997). Implications of partnership sourcing on buyer–supplier relations. Journal of General Management, 23 (1): 53–70.

Mehrabian, A. (1996). Pleasure-arousal-dominance: A general framework for describing and measuring individual differences in Temperament. Current Psychology Winter 1996, 14(4): 261-292.

Merriam-Webster. The definition of 'Value'. [http://www.merriam-webster.com/dictionary/value] Date of access: 04.07.2014.

Metcalf, L. E., Frear, C. R., & Krishnan, R. (1992). Buyer–seller relationships: An application of the IMP interaction model. European Journal of Marketing, 26(2): 27–46.

Metsämuuronen, J. (2009). Tutkimuksen tekemisen perusteet ihmistieteissä.Jyväskylä: Gummerrus Kirjapaino Oy, 1632 p.

Meyer, C. & Schwager, A. (2007). Understanding customer experience. Harvard Business Review, 85(2): 116-26.

Miles, L. D. (1989). Techniques of Value Analysis and Engineering. (3rd ed.) Eleanor Miles Walker, Lawrence D. Miles Value Foundation, Washington, DC.

Miller, C. & Swaddling, D.C. (2002). Focusing NPD Research on Customer-Perceived Value, in The PDMA Toolbook for New Product Development, eds. Belliveau, P.; Griffin, A. & Somermeyer, S., John Wiley & Sons, Inc., New York., pp. 87-114.

Morgan, R. M. & Hunt, S. (1994). The commitment-trust theory of relationship marketing. Journal of Marketing, 58(July): 20-38.

Moriarty, R.T. Jr & Spekman, R.E. (1984), An empirical investigation of the information sources used during the industrial buying process, Journal of Marketing Research, 1(2): 137-147.

Murray, K.B. (1991). A test of services marketing theory: consumer information acquisition activities, Journal of Marketing, 55(1): 10-25.

Möller, K., & Halinen, A. (1999). Business relationships and networks: Managerial challenge of network era. Industrial Marketing Management, 28(5): 413–427.

Möller, K. & Törrönen, P. (2003). Business suppliers' value creation potential: A capability-based analysis. Industrial Marketing Management, 32: 109– 118.

Nam, S., Manchanda, P. & Chintagunta, P.K. (2010). The effects of signal quality and word of mouth on customer acquisition for a video-on-demand service. Marketing Science, 29(4): 690-700.

Nidhra, S.; Yanamadala, M.; Afzal, W. & Torkar, R. (2013). Knowledge transfer challenges and mitigation strategies in global software development – A systematic literature review and industrial validation. International Journal of Information Management, 33: 333-355.

Nielsen, J. (1994) Usability Engineering. Elsevier, 362 p.

Norman, D. (2004) Emotional Design - Why We Love (or Hate) Everyday Things. New York : Basic Books, 257 p.

Obrist, M., Reitberger, W., Wurhofer, D., Förster, F. and Tscheligi, M. (2011). User experience research in the semiconductor factory: a contradiction? Proc. INTERACT'11, pp.144–151.

Okada, E. M. (2005). Justification effects on consumer choice of hedonic and utilitarian goods. Journal of Marketing Research, 42: 43-53.

Olaru, D.; Purchase, S. & Peterson, N. (2008). From customer value to repurchase intentions and recommendations. Journal of Business & Industrial Marketing, 23(8): 554-565.

Ollberg, K. (2013). User Experience as a Basis for Management Decision Making Processes. Master of Science Thesis, Tampere University of Technology, 106 p.

Ordanini, A. (2005) The effects of participation on B2B exchanges: A resource-based view. California Management Review, 47(2), 18 p.

Osterwalder, A. & Pigneur, Y. (2003). Modeling Value Propositions in E-Business. ICEC '03 Proceedings of the 5th international conference on Electronic commerce, pp. 429-436.

Palmatier, R.W. (2008). Interfirm Relational Drivers of Customer Value. Journal of Marketing, 72(4): 76-89.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple item scale for measuring service quality. Journal of Retailing, 64(1): 12–40.

Parasuraman, A. (1997). Reflections on Gaining Competitive Advantage Through Customer Value. Journal of the Academy of Marketing Science, 25(2): 154-161.

Park, J.; Han, S.H.; Kim, H.K.; Cho, Y. & Park, W. (2011). Developing elements of user experience for mobile phones and services: survey, interview and observation approaches. Human Factors and Ergonomic in Manufacturing and Services Industries, 19 (6).

Park, J. & Han, S.H. (2013). Defining user value: A case study of a smartphone. International Journal of Industrial Ergonomics. 43: 271-282.

Parolini, C. (1999). The value net: A tool for competitive advantage. Chichester: John Wiley & Sons Ltd.

Patton, M. G. (2002) Qualitative Research and Evaluation Methods. (3rd ed.) Thousand Oaks, London: Sage, 598 p.

Payne, A. & Holt, S. (2001). Diagnosing Customer Value: Integrating the Value Process and Relationship Marketing. British Journal of Management, 12: 159-182.

Payne, A.F.; Storbacka, K. & Frow, P. (2008). Managing the co-creation of value, Journal of the Academy of Marketing Science, 36: 83–96.

Peck, H., Payne, A., Christopher, M., & Clark, M. (1999). Relationship marketing, strategy and implementation. Oxford, UK: Butterworth Heinemann, 509 p.

Peteraf, M.A. (1993). The cornerstones of competitive advantage: A resource-based view. Strategic Management Journal, 14: 179-192.

Pfeffer, J., & Salancik, G. (1978). The external control of organizations: A resource dependence perspective. New York: Harper and Row.

Picard, R. W. (1997). Affective Computing. Cambridge, MA: MIT Press

Pine, B. J. II & Gilmore, J. H. (1998). Welcome to the experience economy. Harvard Business Review, July-August.

Plewes, S. 16.10.2012. The Competitive Advantage of Using User Experience. [http://www.macadamian.com/2012/10/16/part-4-competitive-advantage-using-user-experience/] Date of access: 8.7.2014.

Pollock, N. & Williams, R. (2009). Software and Organisations: The biography of the enterprise-wide system of how SAP conquered the world.Oxon: Routledge.

Pollock, N. & Hyysalo, S. (2014). The business of being a user: The role of the reference actor in shaping packaged enterprise system acquisition and development. MIS Quarterly, 38(2); 473-496.

Porter, M. (1985). Competitive Advantage: Creating and Sustaining Superior Performance. New York: Free Press.

Porter, M. E. (1996). What is strategy? Harvard Business Review, 44(Nov-Dec): 61-78.

Powers, T.L. & Reagan, W.R. (2007). Factors influencing successful buyer-seller relationships. Journal of Business Research, 60: 1234-1242.

Prendergast, G. P., Marr, N. E., & Jarratt, B. (1996). An exploratory study of tenant–manager relationships in New Zealand's managed shopping centres. International Journal of Retail and Distribution Management, 24(9): 19–26.

Ravald, A. & Grönroos, C. (1996). The Value Concept and Relationship Marketing. European Journal of Marketing, 30(2): 19-30.

Reichheld, F. F. (1994). Loyalty and the renaissance of marketing. Marketing Management, 2(4): 10-20.

Rhodes, J. (2009). Selling Usability: User Experience Infiltration Tactics. CreateSpace Independent Publishing Platform, 245 p.

Riege, A. (2005). Three-dozen knowledge-sharing barriers managers must consider. Journal of Knowledge Management, 9(3): 18-35.

Rieple, A. & Singh, R. (2010). A value chain analysis of the organic cotton industry: The case of UK retailers and Indian suppliers. Ecological Economics, 69(11): 2292-2302.

Rintamäki, T.; Kuusela, H. & Mitronen, L. (2007). Identifying competitive customer value propositions in retailing. Managing Service Quality, 17(6): 621-634.

Robey, D. & Farrow, D. (1982). User involvement in information systems development: a conflict model and empirical test. Management Sciences, 28: 73-85.

Rogers, Y.; Sharp, H. & Preece, J. (2011). Interaction design – beyond human-computer interaction. (3rd ed.) Chichester, Wiley, 585 p.

Roth, M.S., Money, R.B. and Madden, T.J. (2004). Purchasing processes and characteristics of industrial service buyers in the U.S. and Japan. Journal of World Business, 39(2): 183-198.

Rugg, G. E. M.; Mahmood, A.; Rehman, N.; Andrews, S. & Davies, S. (2002). Eliciting information about organizational culture via laddering. Information Systems Journal, 12: 215-229.

Russell, J. A. (2003). Core Affect and the Psychological Construction of Emotion. Psychological Review, 110(1): 145-172.

Saldana, J. (2013). The Coding Manual for Qualitative Researchers. (2nd ed.) SAGE Publications, 303 p.

Sánchez-Fernández, R. & Ángeles Iniesta-Bonillo, M. (2007). The concept of perceived value: a systematic review of the research. Marketing Theory, 7(4): 427-451.

Saunders, M.; Lewis, P. & Thornhill, A. (2009) Research methods for business students. (5th ed.) Prentice Hall, 614 p.

Selden, L. and MacMillan, I.C. (2006). Manage customer-centric innovation – systemically. Harvard Business Review, 84(4): 108-16.

Shamlin, J. (3.4.2013). User Experience as Competitive Advantage. [http://www.uxbrainstorm.org/user-experience-as-competitive-advantage/] Date of access: 8.7.2014.

Shenton, A.K. (2004) Strategies for ensuring trustworthiness in qualitative research projects. Education for Information, 22: 63-75.

Silverman, D. (2007). Interpreting Qualitative Data. 3rd edition. London: Sage Publications.

Singh, S.N. & Dalai, N.P. (1999). Web home pages as advertisements. Communications of the ACM, 42: 91-98.

Smith, G.E. & Nagle, T.T. (2005). A question of value. Marketing Management, 14(4): 38-43.

Song, X.; Thieme, R.J. & Xie, J. (1998) The impact of cross-functional joint involvement across product development stages: An exploratory study. Journal of Product Innovation Management, 15 (4): 289-304.

Souder, W.E. (1988). Managing relations between R&D and marketing in new product development products. Journal of Product Innovation Management, 5 (1): 6-19.

Stabell., C.B. & Fjeldstad, O.D. (1998). Configuring Value for Competitive Advantage: On Chains, Shops and Networks. Strategic Management Journal, 19: 413-437.

Strandvik, T.; Holmlund, M. & Edvardsson, B. (2011). Customer needing: a challenge for the seller offering", Journal of Business & Industrial Marketing, 27(2): 132 – 141.

Sutcliffe, A.G. (2001). Heuristic Evaluation of Website Attractiveness and Usability. DSV-IS '01 Proceedings of the 8th International Workshop on Interactive Systems: Design, Specification, and Verification-Revised Papers, 183-198.

Sward, D. (2007). User Experience Design: A Strategy for Competitive Advantage. AMCIS 2007 Proceedings. Paper 163.

Tomlin, C. (24.03.2010). 7 Reasons Why You Can't Sell Usability. [http://www.usefulusability.com/7-reasons-why-you-can%E2%80%99t-sell-usability/] Date of access: 16.06.2014.

Tractinsky, N.; Katz, A. & Ikar, D. (2000). What is beautiful is usable. Interacting with Computers, 13(2): 127-145.

Tullis, T. & Albert, B. (2008). Measuring the User Experience – Collecting, Analyzing, and Presenting Usability Metrics. Elsevier, Morgan Kaufmann, 317 p.

Tuomi, J. & Sarajärvi, A. (2002). Laadullinen tutkimus ja sisällönanalyysi. Helsinki: Tammi, 158 p.

Turnbull, P.W. & Valla, J.-P. (2013). Strategies for international industrial marketing. Routledge, 328 p.

Ulaga, W. & Chacour, S. (2001). Measuring customer-perceived value in business markets. Industrial Marketing Management, 30: 525-540.

Ulaga, W. (2003). Capturing value creation in business relationships: A customer perspective. Industrial Marketing Management, 32: 677– 693.

Ulaga, W., & Eggert, A. (2005). Relationship value in business markets: The construct and its dimensions. Journal of Business–to–Business Marketing, 12(1): 73–99.

Ulaga, W., & Eggert, A. (2006). Value-based differentiation in business relationships: Gaining and sustaining key supplier status. Journal of Marketing, 70(1): 119–136.

Van der Haar, J. W.; Kemp, R. G. M. & Omta, O. (2001). Creating value that cannot be copied. Industrial Marketing Management, 30: 627-636.

van Wijk, R.; Jansen, J.J.P. & Lyles, M.A. (2008). Inter- and Intra-Organizational Knowledge Transfer: A Meta-Analytic Review and Assessment of its Antecedents and Consequences, *Journal of Management Studies*, 45(4): 830-853.

Vaughan, M.V. (2011). Tough Sell: Selling User Experience. Journal of Usability Studies, 6(2): 48 – 51.

Verganti, C. (2011). Designing breakthrough products, Harvard Business Review, 85(Oct): 115–120.

Vermeeren, A.; Law, E. L.-C.; Roto, V.; Obrist, M.; Hoonhout, J. & Väänänen-Vainio-Mattila, K. (2010). User experience evaluation methods: Current state and development needs. Proceedings: NordiCHI 2010, October 16–20, 2010, Reykjavik, Iceland, pp. 521-530.

Vuolle, M., Kallio, T., Kulju, M., Tiainen, M., Vainio, T. and Wigelius, H. (2008). Developing a questionnaire for measuring mobile business service experience. Proc. MobileHCI 2008, pp.53–62.

Väätäjä, H.; Koponen, T. & Roto, V. (2009). Developing Practical Tools for User Experience Evaluation – A Case from Mobile News Journalism. ECCE 2009, September 30 – October 2, 2009, Helsinki, Finland.

Väätäjä, H. (2010a) 'User experience evaluation criteria for mobile news making technology: findings from a case study', Proc. OZCHI '10, pp.152–159.

Väätäjä, H. (2010b) 'User experience of smart phones in mobile journalism: early findings on influence of professional role', Proc. OZCHI '10, pp.1–4.

Väätäjä, H.; Seppänen, M. & Paananen, A. (2014). Creating value through user experience: a case study in the metals and engineering industry. International Journal of Technology Marketing, 9(2): 163-186.

Walser, K. (21.09.2009). UX in the Boardroom: A Solid Case for Investing in UX. [http://www.uxmatters.com/mt/archives/2009/09/ux-in-the-boardroom-a-solid-case-for-investing-in-ux.php#sthash.QqKYddeb.dpuf] Date of access: 16.06.2014.

Walters, D. & Lancaster, G. (1999) Value and information – concepts and issues for management. Management Decision, 37(8): 643-656.

Ward, J., & Reingen, P. (1996). A network perspective on crossing the micro–macro divide in consumer behavior research. In D. Iacobucci (Ed.), Networks in marketing CA,USA: Sage. pp. 303–324.

Webster, F.E. & Wind, Y. (1972). Organizational Buying Behavior. Englewood Cliffs, NJ: Prentice Hall.

Webster, F. E. (1992). The changing role of marketing in the corporation. Journal of Marketing, 56 (Oct.): 1–17.

Webster, F.E. Jr (1994). Defining the new marketing concept, Marketing Management, 2(4): 22-31.

Weitz, B. A., & Jap, S. D. (1995). Relationship marketing and distribution channels. Journal of the Academy of Marketing Science, 23(4): 305–320.

Whiteside, J. & Wixon, D. (1987). The dialectic of usability engineering. In INTERACT 87 – 2nd IFIP International Conference on Human – Computer Interaction. September 1 – 4, 1987, Stuttgart, Germany, pp. 17 – 20.

Wilkinson, I., & Young, L. (2002). On cooperating: Firms, relations, networks. Journal of Business Research, 55: 123– 132.

Wilkstrom, S. (1996). The customer as co-producer. European Journal of Marketing, 30(4): 6–19.

Williamson, O.E. (1985). The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting, New York: Free Press.

Wilson, D. T. & Jantrania, S. A. (1994). Understanding the Value of the Relationship. Asia-Australia Marketing Journal, 2(1): 55-66.

Wilson, D. T. (1995). An integrated model of buyer–seller relationships. Academy of Marketing Science Journal, 23(4): 335–345.

Wilson, D. T., & Vlosky, R. P. (1998). Interorganizational information system technology and buyer–seller relationships. Journal of Business and Industrial Marketing, 13(3): 215–234.

Woodall, T. (2003). Conceptualising 'value for the customer': an attributional, structural and dispositional analysis, Academy of Marketing Science Review, 12: 1–44.

Woodruff, R. B. & Gardial, S. F. (1996). Know your customer: New approaches to understanding customer value and satisfaction. Blackwell, Cambridge, MA, 338 p.

Woodruff, R. B. (1997). Customer value: The next source for competitive advantage. Journal of the Academy of Marketing Science, 25(2): 139-153.

Yang, S., Hu, M., Winter, R.S., Assael, H. & Chen, X. (2012). An empirical study of word-of-mouth generation and consumption, Marketing Science, 31(6): 952-963.

Yang, T.-M. & Maxwell, T.A. (2011). Information-sharing in public organizations: A literature review of interpersonal, intra-organizational and inter-organizational success factors. Government Information Quarterly, 28: 164-175.

Yardley, L. & Bishop, F. (2008). Mixing Qualitative and Quantitative Methods: A Pragmatic Approach, in The SAGE Handbook of Qualitative Research in Psychology, ed. Willig, C. & Stainton-Rogers, W., pp. 352-372.

Yin, R.K. (1994). Case Study Research: Design and Methods. (2nd ed.), Thousand Oaks: Sage. Applied Social Research Methods Series, Vol. 5.

Zeithaml, V.A. (1988). Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. Journal of Marketing, 52(3): 2-22.

Zijlstra, F.R.H. (1993). Efficiency in work behaviour: a design approach for modern tools. Dissertation, Faculty of Industrial Design Engineering, Delft University of Technology.

Zimmermann, P.G. (2008). Beyond Usability – Measuring Aspects of User Experience. Dissertation, Swiss Federal Institute of Technology Zurich, 112 p.

7 Appendices (5 pieces)

Appendix 1. *Interview outlines*

R&D	S&M	Customers
Background - Job description - Focal work tasks - Career	Background - Job description - Focal work tasks - Career	Background - Job description - Focal work tasks - Career
NPD process - Goals of the process - Comparison with previous models - Participants in NPD (sales/ marketing/ customers/ users)	NPD process - Cooperation with R&D - Gaining and utilizing customer feedback - Internal introduction of new product - Sales training from R&D	Company - Basic information of the company - Description of need for the new product
Sales process - Role in selling the product - Cooperation with sales/marketing - Product launch - Sales process - Sales / marketing material	Sales process - Examples of sales cases - Sales techniques - Sales material - UX in sales - Participants in investment decisions	Investment decision process - Prior relationship with the supplier - Expectations/ requirements for the product - Detailed description of the decision process
Benefits for the customer - Benefits of the product to the customer - Benefits of the product to users - Competitive advantage of the supplier - Sales argumentation	Marketing - Marketing material - Communicating to customers - UX in marketing	Investment decision - Comparsion to other suppliers - Participants in decision making - Used sales argumentation - Investment decision criteria
UX - UX as a concept - UX in strategy - Communicating UX - UX in work tasks - Users of the product - Designing UX	Benefits for the customer - Benefits of the product to the customer - Benefits of the product to users - Competitive advantage of the supplier - Sales argumentation	Benefits of the product - Benefits of the product to the customer - Benefits of the product to users - Feedback from users - Sacrifices made in purchasing the products
	UX - UX as a concept - UX in strategy - Communicating UX - UX in work tasks	

Appendix 2. *The literature used for the construction of the quantitative study.*

REFERENCES

1. S. Ashkanasy, P. Benda, and F. Vetere. Happy coincidences in designing for social connectedness and play through opportunistic image capture. In Proc. DUX ’07. ACM, 2007.
2. M. Blythe and P. Cairns. Critical methods and user generated content: the iPhone on YouTube. In Proc. CHI ’09, pages 1467–1476. ACM, 2009.
3. M. Blythe, J. Reid, P. Wright, and E. Geelhoed. Interdisciplinary criticism: analysing the experience of riot! a location-sensitive digital narrative. Behaviour & Information Technology, 25(2):127–139, 2006.
4. M. Blythe, J. Robinson, and D. Frohlich. Interaction design and the critics: what to make of the weegie. In Proc. NordiCHI ’08, pages 53–62. ACM, 2008.
5. M. Chamorro-Koc, V. Popovic, and M. Emmison. Using visual representation of concepts to explore users and designers’ concepts of everyday products. Design Studies, 29(2):142–159, 2008.
6. B. Costello and E. Edmonds. A study in play, pleasure and interaction design. In Proc. DPPI ’07, page 91. ACM, 2007.
7. B. Costello and E. Edmonds. Directed and emergent play. In Proc. C&C 09, pages 107–116. ACM, 2009.
8. S. Diefenbach and M. Hassenzahl. The Beauty Dilemma: beauty is valued but discounted in product choice. In Proc. CHI 2009, pages 1419–1426. ACM, 2009.
9. S. Gilroy, M. Cavazza, and M. Benayoun. Using affective trajectories to describe states of flow in interactive art. In Proc. ACE ’09, pages 165–172. ACM, 2009.
10. J. Hartmann, A. De Angeli, and A. Sutcliffe. Framing the user experience: information biases on website quality judgement. In Proc. CHI ’08, pages 855–864. ACM, 2008.
11. J. Hartmann, A. Sutcliffe, and A. Angeli. Towards a theory of user judgment of aesthetics and user interface quality. ACM TOCHI, 15(4):1–30, 2008.
12. M. Hassenzahl, M. Schöbel, and T. Trautmann. How motivational orientation influences the evaluation and choice of hedonic and pragmatic interactive products: The role of regulatory focus. Interacting with Computers, 20(4-5):473–479, 2008.
13. M. Hassenzahl and D. Ullrich. To do or not to do: Differences in user experience and retrospective judgments depending on the presence or absence of instrumental goals. Interacting with Computers, 19(4):429–437, 2007.
14. J. Heikkinen, T. Olsson, and
K. Väänänen-Vainio-Mattila. Expectations for user experience in haptic communication with mobile devices. In Proc. MobileHCI ’09, page 28. ACM, 2009.
15. M. Isomursu, M. Ta¨hti, S. Väinämö , and K. Kuutti. Experimental evaluation of five methods for collecting emotions in field settings with mobile applications. International Journal of Human-Computer Studies, 65(4):404–418, 2007.
16. S. Jacobson and A. Pirinen. Disabled persons as lead users in the domestic environment. In Proc. DPPI ’07, pages 158–167. ACM, 2007.
17. S. Jumisko-Pyykkö , M. Weitzel, and D. Strohmeier. Designing for user experience: what to expect from mobile 3d tv and video? In Proc. UXTV ’08, pages 183–192. ACM, 2008.
18. E. Karapanos, J. Zimmerman, J. Forlizzi, and J. Martens. User experience over time: an initial framework. In Proc. CHI ’09, pages 729–738. ACM, 2009.

19. A. Koca, M. Funk, E. Karapanos, A. Rozinat, and N. van der Gaarden. Grasping product pragmatics: a case with internet on tv. In Proc. UXTV ’08, pages 193–202. ACM, 2008.
20. P. Kourouthanassis, G. Giaglis, and A. Vrechopoulos. Enhancing user experience through pervasive information systems: The case of pervasive retailing. International Journal of Information Management, 27(5):319–335, 2007.
21. M. Lankes, S. Riegler, A. Weiss, T. Mirlacher, M. Pirker, and M. Tscheligi. Facial expressions as game input with different emotional feedback conditions. In Proc. ACE ’08, pages 253–256. ACM, 2008.
22. J. Lee and K. Lee. Cultural differences and design methods for user experience research: Dutch and Korean participants compared. In Proc. DPPI ’07, pages 21–34. ACM, 2007.
23. T. Leong, S. Howard, and F. Vetere. Choice: abidcating or exercising? In Proc. CHI ’08, pages 715–724. ACM, 2008.
24. T. Leong, F. Vetere, and S. Howard. Randomness as a resource for design. In Proc. DIS ’06, pages 132–139. ACM, 2006.
25. N. Liu, Y. Liu, L. Liu, and X. Wang. User experience evaluation of Post-Traumatic Mobile Service: a case study. In Proc. Mobile Technology, Application & Systems, pages 1–4. ACM, 2009.
26. A. Lucero, T. Lashina, E. Diederiks, and T. Mattelmäki. How probes inform and influence the design process. In Proc. DPPI ’07, page 391. ACM, 2007.
27. S. Mahlke and M. Turing. Studying antecedents of emotional experiences in interactive contexts. In Proc. CHI ’07, pages 915–918. ACM, 2007.
28. R. Mandryk, K. Inkpen, and T. Calvert. Using psychophysiological techniques to measure user experience with entertainment technologies. Behaviour & Information Technology, 25(2):141–158, 2006.
29. N. Mathiasen and S. Bødker. Threats or threads: from usable security to secure experience? In Proc. NordiCHI ’08, pages 283–289. ACM, 2008.
30. D. McKay, S. Cunningham, and K. Thomson. Exploring the user experience through collage. In Proc. CHINZ ’06, pages 109–115. ACM, 2006.
31. M. Montola, T. Nummenmaa, A. Lucero, M. Boberg, and H. Korhonen. Applying game achievement systems to enhance user experience in a photo sharing service. In Proc. MindTrek ’09, pages 94–97. ACM, 2009.
32. M. Nı Chonchuir and J. Mccarthy. The enchanting potential of technology: a dialogical case study of enchantment and the internet. Personal and Ubiquitous Computing, 12(5):401–409, 2008.
33. H. O’Brien and E. Toms. What is user engagement? A conceptual framework for defining user engagement with technology. Journal of the American Society for Information Science and Technology, 59(6):938–955, 2008.
34. T. Olsson, P. Ihamäki, E. Lagerstam, L. Venta¨-Olkkonen, and K. Va¨a¨na¨nen-Vainio-Mattila. User expectations for mobile mixed reality services: an initial user study. In Proc. ECCE ’09, pages 1–9. ACM, 2009.
35. Y. Rogers, K. Connelly, L. Tedesco, W. Hazlewood, A. Kurtz, R. Hall, J. Hursey, and T. Toscos. Why it’s worth the hassle: the value of in-situ studies when designing Ubicomp. In Proc. UbiComp ’07, pages 336–353. Springer-Verlag, 2007.
36. S. Rosenbaum, C. Glenton, and J. Cracknell. User experiences of evidence-based online resources for health professionals: User testing of The Cochrane Library. BMC Medical Informatics and Decision Making, 8(34), 2008.
37. P. Ross, C. Overbeeke, S. Wensveen, and C. Hummels. A designerly critique on enchantment. Personal and ubiquitous computing, 12(5):359–371, 2008.

38. K. Segerstahl. Utilization of pervasive IT compromised?: understanding the adoption and use of a cross media system. In Proc. MUM ’08, pages 168–175. ACM, 2008.
39. X. Sun and A. May. The role of spatial contextual factors in mobile personalization at large sports events. Personal and Ubiquitous Computing, 13(4):293–302, 2009.
40. D. Swallow, M. Blythe, and P. Wright. Grounding experience: relating theory and method to evaluate the user experience of smartphones. In Proc. EACE ’05, pages 91–98. University of Athens, 2005.
41. D. Syrdal, N. Otero, and K. Dautenhahn. Video prototyping in human-robot interaction: results from a qualitative study. In Proc. ECCE ’08. ACM, 2008.
42. M. Turunen, A. Kallinen, I. Sanchez, et al. Multimodal interaction with speech and physical touch interface in a media center application. In Proc. ACE ’09, pages 19–26. ACM, 2009.
43. K. Väänänen-Vainio-Mattila and M. Wa¨ljas. Developing an expert evaluation method for user eXperience of cross-platform web services. In MindTrek ’09, pages 162–169. ACM, 2009.
44. H. Väätäjä, T. Koponen, and V. Roto. Developing practical tools for user experience evaluation: a case from mobile news journalism. In Proc. ECCE ’09, pages 1–8. ACM, 2009.
45. K. van Boerdonk, R. Tieben, S. Klooster, and E. van den Hoven. Contact through canvas: an entertaining encounter. Personal and Ubiquitous Computing, 13(8):551–567, 2009.
46. P. van Schaik and J. Ling. Modelling user experience with web sites: Usability, hedonic value, beauty and goodness. Interacting with Computers, 20(3):419–432, 2008.
47. P. van Schaik and J. Ling. The role of context in perceptions of the aesthetics of web pages over time. International Journal of Human-Computer Studies, 67(1):79–89, 2009.
48. D. Vyas and G. van der Veer. Rich evaluations of entertainment experience: bridging the interpretational gap. In Proc. ECCE ’06, pages 137–144. ACM, 2006.
49. R. Wakkary and M. Hatala. ec (h) o: Situated Play in a Tangible and Audio Museum Guide. In Proc. DIS ’06, page 290. ACM, 2006.
50. D. Wilfinger, M. Pirker, R. Bernhaupt, and M. Tscheligi. Evaluating and investigating an iTV interaction concept in the field. In Proc. EuroITV ’09, pages 175–178. ACM, 2009.
51. D. Xu, J. Read, G. Sim, B. McManus, and P. Qualter. Children and’smart’technologies: can children’s experiences be interpreted and coded? In Proc. BCS HCI ’09, pages 224–231. British Computer Society, 2009.

Appendix 3. *Grouped UX items from prior research (Bargas-Avila & Hornbaek, 2011).*

Group	Item	Measuring Tool (e.g. SAM)	Reference Number of Original Article
Learnability	Easy to learn	Own	42
	Learning how to use new functions is difficult.	SUMI	27
	Learning to operate this software initially is full of problems.	SUMI	27
	I will never learn to use all that is offered in this software.	SUMI	27
Efficiency	There are too many steps required to get some-thing to work	SUMI	27
	Inefficient	Attrak Work	44
	Slows down publishing from the field	Attrak Work	44
	Obstructing	AttrakDiff	12
	Obstructs the workflow	Attrak Work	44
	Slows down work	Attrak Work	44
	Makes work harder	Attrak Work	44
	Speeds up work	Attrak Work	44
	Efficient	Attrak Work	44
	Speeds up publishing from the field	Attrak Work	44
	Supports the workflow	Attrak Work	44
	Fast to use	Own	42
Effecti-veness	Supports goals	Attrak Work	44
	Supports goal achieving	Pleasure of play	6, 7
	Lowers quality	Attrak Work	44
	Enhances quality	Attrak Work	44
Ease of use	Easy to use	Lavie & Tractinsky	10, 10, 11
	simple to use	Own	42
	Easy orientation	Lavie & Tractinsky	10, 10, 11
	Easy to navigate	Lavie & Tractinsky	10, 10, 11
	easy to operate	Own	25
	Convenient use	Lavie & Tractinsky	10, 10, 11
	Easy	AttraKDiff2, Attrak Work, Own	18, 19, 46, 50, 44, 28
	Makes work easier	Attrak Work	44
	Effortless	Attrak Work	44
	Cumbersome	AttrakDiff2	18, 19, 46, 50
Intuitiveness	Confusing	AttrakDiff2, Attrak Work, AttrakDiff	18, 19, 46, 50, 44, 12
	Intuitive	Attrak Work	44
	Simple	AttrakDiff2, Attrak Work, AttrakDiff, Own	18, 19, 46, 50, 44, 12, 48
	human	AttrakDiff2	18, 19, 46, 50
	Complex	AttrakDiff	12

	Technical	AttrakDiff2	18, 19, 46, 50
	Difficult	Attrak Work	44
	Complicated	AttraKDiff2, Attrak Work	18, 19, 46, 50, 44
	Comprehensible	AttrakDiff,Own	12, 48
	Incomprehensible	AttrakDiff	12
Logicality	Predictable	AttrakDiff2, AttrakDiff, Own	18, 19, 46, 50, 12, 48
	Logical	Attrak Work	44
	The organisation of the menus seems quite logical.	SUMI	27
	Illogical	Attrak Work	44
	Unpredictable	AttrakDiff2, AttrakDiff	18, 19, 46, 50, 12
Controllability	manageable	AttraKDiff2	18, 19, 46, 50
	Controllable	AttrakDiff, Own	12, 48
	I feel in command of this software when I am using it	SUMI	27
	It is easy to make the software do exactly what you want.	SUMI	27
	Uncontrollable	Attrak Work	44
	Unruly	AttrakDiff2	18, 19, 46, 50
	This software occasionally behaves in a way which can't be understood.	SUMI	27
	submissive	SAM, PAD	12, 13, 15, 37, 45, 9
	Dominating	SAM, PAD	12, 13, 15, 37, 45, 9
Confidence in use	I sometimes wonder if I am using the right function.	SUMI	27
	I sometimes don't know what to do next with this software	SUMI	27
	Needs guessing	Attrak Work	44
Informativeness	provides enough details	Own	11
	informative	Own	11
	There is never enough information on the screen when it's needed.	SUMI	27
	Provides reliable information	Lavie & Tractinsky	10, 10, 11
	I can understand and act on the information provided by this software.	SUMI	27
	The way that system information is presented is clear and understandable.	SUMI	27
Reliability	Faultless	Lavie & Tractinsky	10, 10, 11
	Reliable	Lavie & Tractinsky, Attrak Work, Own	10, 10, 11, 44, 25
	Effective	Own	25
	Robust to use	Own	42
	Trustworthy	AttrakDiff	12
	Unreliable	Attrak Work	44
Desirability	Undesirable	AttrakDiff	12, 13
	Attractive	AttrakDiff, Own, Attrak Work	12, 13, 48, 44

	Desirable	AttrakDiff, Own	12, 13, 48
	Unattractive	AttrakDiff, Attrak Work	12, 13, 44
	I would not like to use this software every day.	SUMI	27
Approachability	Sympathetic	AttrakDiff, Own	12, 13, 48
	Inviting	AttrakDiff	12, 13
	Lowers the threshold of interviewees	Attrak Work	44
	Unpleasant	AttrakDiff, Attrak Work	12, 13, 44
	Unsympathetic	AttrakDiff	12, 13
	Discouraging	AttrakDiff, Attrak Work	12, 13, 44
	Strange	AttrakDiff	12
	Shady	AttrakDiff	12
	Rejecting	AttrakDiff	12, 13
	Pleasant	AttrakDiff, Own, Attrak Work, Own	12, 13, 48, 44, 11
Recommendability	recommendable	Own	25
	I would recommend this software to my colleagues.	SUMI	27
Social acceptance	Enhances respect for the work	Attrak Work	44
	Lowers respect for the work	Attrak Work	44
	Lowers professional image	Attrak Work	44
	Promotes professional image	Attrak Work	44
	Credible	Attrak Work	44
	Raises trust	Attrak Work	44
	Increases suspicion in interviewees	Attrak Work	44
	Unconvincing	Attrak Work	44
	acceptable by others	Own	42
	Lowers trust	Attrak Work	44
Inclusiveness	Provides sense of friendship	Pleasure of play	6, 7
	Brings me closer to people	AttrakDiff2	18, 19, 46, 50
	Integrating	AttrakDiff2	18, 19, 46, 50
	Inclusive	AttrakDiff2	18, 19, 46, 50
	Supports sharing emotional feelings	Pleasure of play	6, 7
	Noninclusive	AttrakDiff2	18, 19, 46, 50
	Takes me distant from people	AttrakDiff2	18, 19, 46, 50
	Isolating	AttrakDiff2	18, 19, 46, 50
Value	Important	Attrak Work	44
	Valuable	AttrakDiff2	18, 19, 46, 50
	Costly	AttrakDiff	12
	Valued by professionals	Attrak Work	44
	Undervalued by professionals	Attrak Work	44
	Cheap	AttrakDiff2, AttrakDiff	18, 19, 46, 50, 12

	Insignificant	Attrak Work	44
	Bad	AttrakDiff2, Attrak Work, AttrakDiff	18, 44, 12, 13
	Good	AttrakDiff2, Attrak Work, AttrakDiff, Own	18, 44, 12, 13, 48
	It is obvious that user needs have been fully taken into consideration.	SUMI	27
	Working with this software is satisfying.	SUMI	27
Usefulness	Useless	Attrak Work	44
	Useful	Own, Attrak Work	42, 44
	Feasible	Own	25
	Practical	AttraKDiff2, Attrak Work	18, 19, 46, 50, 44
	practical to use	Own	42
	Impractical	AttraKDiff2, Attrak Work	18, 19, 46, 50, 44
	Interaction style fits this context	Own	42
Skill deve-lopment	Supports skill developing	Pleasure of play	6, 7
	Stimulates learning	Attrak Work	44
	educational	Own	11
	Restricts development	Attrak Work	44
	Prevents learning	Attrak Work	44
Support for creativity	innovative way to work	Own	42
	Supports creating	Pleasure of play	6, 7
	Enables creativity	Attrak Work	44
	Limits creativity	Attrak Work	44
Challenge	Offers challenges	Attrak Work	44
	challenging	AttraKDiff2, Attrak Work, Own	18, 19, 46, 50, 44, 28, 28
	Required level of mental effort	SMEQ	13
Empowering	Restricting	Attrak Work	44
	Forces compromise	Attrak Work	44
	Constricts professional ambition	Attrak Work	44
	Supporting	AttrakDiff, Own	12, 48
	The software has helped me overcome any prob-lems I have had in using it.	SUMI	27
	Enables professional ambition	Attrak Work	44
Arousing	Frustrating	Own, Attrak Work	28, 28, 44
	Provides sensations	Pleasure of play	6, 7
	Exciting to use	Own	42
	Exciting	AttraKDiff2, Attrak Work, Own, AttrakDiff, Own	18, 19, 46, 50, 44, 28, 28, 12, 48
	Thrilling	Own	48
	Arousing	SAM, PAD	12, 13, 15, 27, 37, 45, 9
	Inspiring	Attrak Work	44

	Motivating	AttrakDiff, Own, Attrak Work	12, 13, 48, 44
	Provides feel of danger	Pleasure of play	6, 7
	Pleasurable	SAM, PAD	12, 13, 15, 27, 37, 45, 9
	Displeasurable	SAM, PAD	12, 13, 15, 27, 37, 45, 9
	Non-arousing	SAM, PAD	12, 13, 15, 27, 37, 45, 9
Captivating	Enables discovering	Pleasure of play	6, 7
	Fascinating design	Lavie & Tractinsky	10, 10, 11, 47
	Interesting	AttrakDiff, Own, Attrak Work	12, 48, 44
	Engaging	Own, Own	11, 28
	Immersive	Pleasure of play	6, 7
	Simulation	Pleasure of play	6, 7
	Supports exploring	Pleasure of play	6, 7
	Enable possibility to break rules/subversive	Pleasure of play	6, 7
Fun	Relaxed	Attrak Work	44
	Fun	Own	28, 28
	Serious	Attrak Work	44
	Lame	AttrakDiff2	18, 19, 46, 50
	Dull	AttrakDiff, Attrak Work	12, 44
	Boring	Own, AttrakDiff	28, 28, 12
Aesthetic design	Aesthetic	AttrakDiff, Own	12, 13, 48
	Beautiful	AttrakDiff2	18
	Aesthetic design	Lavie & Tractinsky	10, 10, 11, 27, 47
	Ugly	AttrakDiff2	18
	Gaudy	AttrakDiff2	18, 19, 46, 50
	Unpresentable	AttrakDiff2	18, 19, 46, 50
	Unaesthetic	AttrakDiff	12, 13
	Presentable	AttrakDiff2	18, 19, 46, 50
Innovati-veness / Originality	Creative design	Lavie & Tractinsky	10, 10, 11, 47
	Innovative	AttrakDiff2, AttrakDiff, Own	18, 19, 46, 50, 12, 48
	Original	AttrakDiff2, AttrakDiff, Own	18, 19, 46, 50, 12, 48
	New	AttrakDiff2	18, 19, 46, 50
	Original design	Lavie & Tractinsky	10, 10, 11
	Spontaneous	Own	13
	Imaginative	Pleasure of play	6, 7
	Creative	AttrakDiff2	18, 19, 46, 50
	Impressive	AttrakDiff, Own	12, 48

	Courageous	AttrakDiff2	18, 19, 46, 50
Pleasant design	Symmetric	Sutcliffe et al	11
	Symmetric design	Lavie & Tractinsky	10, 10, 11, 27
	Pleasant design	Lavie & Tractinsky	10, 10, 11, 27, 47
	Conscious use of colors	Sutcliffe et al	11
Classy design	Stylish	Sutcliffe et al	11
	Classy	AttraKDiff2, Own	18, 19, 46, 50, 42
	Sophisticated design	Lavie & Tractinsky	10, 10, 11, 47
	Exclusive	AttrakDiff, Own	12, 48
Clarity	Clear design	Lavie & Tractinsky	10, 10, 10, 10, 11, 11, 27
	Consistent layout	Sutcliffe et al	11
	Structured layout	Sutcliffe et al	11
	Clean design	Lavie & Tractinsky	10, 10, 11, 27, 47
	Possibilities of UI are visible	Own	42
	Clear	AttrakDiff2, Attrak Work, AttrakDiff, Own	18, 19, 46, 50, 44, 12, 48
	It is easy to see at a glance what the options are at each stage	SUMI	27
Common / Traditional	Conservative	AttrakDiff2, AttrakDiff	18, 19, 46, 50, 12
	Cautious	AttrakDiff2	18, 19, 46, 50
	Nondescript	AttrakDiff	12
	Typical	AttrakDiff2	18, 19, 46, 50
	Commonplace	AttrakDiff2	18, 19, 46, 50
	Ordinary	AttrakDiff	12
	Standard	AttrakDiff2, AttrakDiff	18, 19, 46, 50, 12
	Familiar	AttrakDiff, Own	12, 48
Professional	Professional	AttrakDiff2, Attrak Work	18, 19, 46, 50, 44
	Amateurish	AttrakDiff2, Attrak Work	18, 19, 46, 50, 44
Use of special effects	Use of personality in media to attract and persuade	Sutcliffe et al	11
	Design of unusual or challenging images	Sutcliffe et al	11
	Use of special effects	Lavie & Tractinsky	10, 10, 11
	Choice of media to attract attention	Sutcliffe et al	11
	Deep depth of field	Sutcliffe et al	11

Appendix 4. *User Experience Survey for users.*

Evaluate with a numerical scale from 1 to 7, how important are the following factors for you considering the [product name here]. Circle your evaluation on the scale 1 = Not at all important – 7 = Extremely important.

For example: When evaluating the [product] it is important for me that it is…

Fast **1 2 3 4 (5) 6 7**

When evaluating the [product] it is important for me that it is…	**Your evaluation with a scale 1-7 (1=Not at all important, 7=Extremely important)**	**Do not know**
Attractive	1 2 3 4 5 6 7	
Clear	1 2 3 4 5 6 7	
Controllable	1 2 3 4 5 6 7	
Creative	1 2 3 4 5 6 7	
Easy to learn	1 2 3 4 5 6 7	
Easy to use	1 2 3 4 5 6 7	
Efficient to use	1 2 3 4 5 6 7	
Ergonomic to use	1 2 3 4 5 6 7	
Pleasant to use	1 2 3 4 5 6 7	
Practical	1 2 3 4 5 6 7	
Predictable	1 2 3 4 5 6 7	
Professional	1 2 3 4 5 6 7	
Reliable	1 2 3 4 5 6 7	
Safe to use	1 2 3 4 5 6 7	
Simple	1 2 3 4 5 6 7	
Supports goal achievement	1 2 3 4 5 6 7	
Visually aesthetic	1 2 3 4 5 6 7	

Appendix 5. *User Experience Survey for R&D.*

Evaluate with a numerical scale from 1 to 7, how important are the following factors for you considering the development of [product name here]. Circle your evaluation on the scale 1 = Not at all important – 7 = Extremely important.

For example: When evaluating the [product] it is important for me that it is…

Fast **1 2 3 4 (5) 6 7**

I find it important that the [product] is…	**Your evaluation with a scale 1-7 (1=Not at all important, 7=Extremely important)**	**Do not know**
Attractive	1 2 3 4 5 6 7	
Clear	1 2 3 4 5 6 7	
Controllable	1 2 3 4 5 6 7	
Creative	1 2 3 4 5 6 7	
Easy to learn	1 2 3 4 5 6 7	
Easy to use	1 2 3 4 5 6 7	
Efficient to use	1 2 3 4 5 6 7	
Ergonomic to use	1 2 3 4 5 6 7	
Pleasant to use	1 2 3 4 5 6 7	
Practical	1 2 3 4 5 6 7	
Predictable	1 2 3 4 5 6 7	
Professional	1 2 3 4 5 6 7	
Reliable	1 2 3 4 5 6 7	
Safe to use	1 2 3 4 5 6 7	
Simple	1 2 3 4 5 6 7	
Supports goal achievement	1 2 3 4 5 6 7	
Visually aesthetic	1 2 3 4 5 6 7	

Tampereen teknillinen yliopisto
PL 527
33101 Tampere

Tampere University of Technology
P.O.B. 527
FI-33101 Tampere, Finland

ISBN 978-952-15-3445-4
ISSN 1459-2045